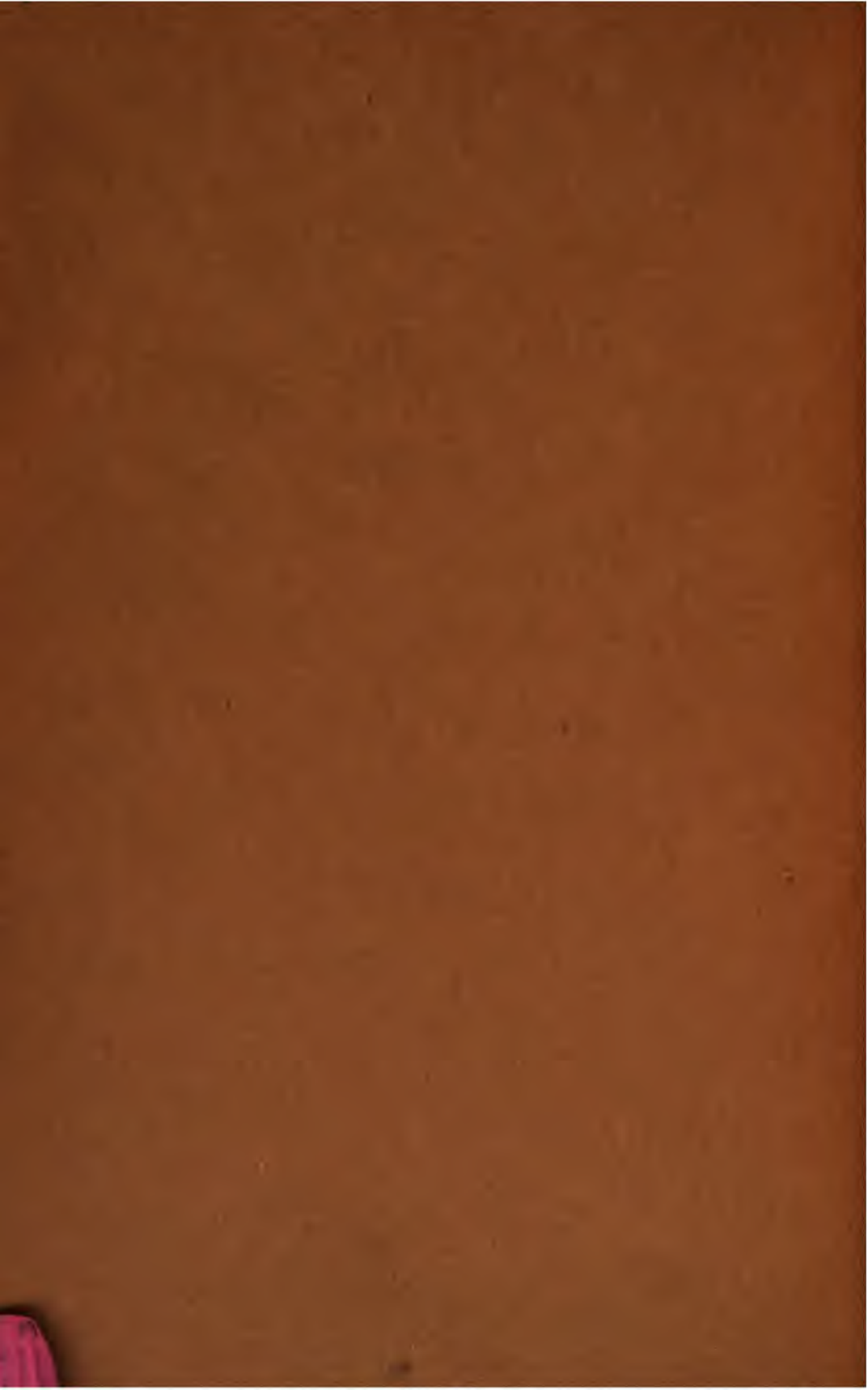

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PROGRESSIVE MEDICINE.

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES, AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES.

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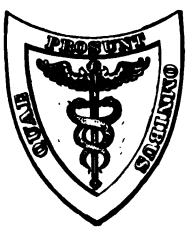
SURGERY OF THE HEAD, NECK AND THORAX—INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM AND CROUPOUS PNEUMONIA—THE DISEASES OF CHILDREN—RHINOLOGY AND LARYNGOLOGY—OTOLOGY.



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PROGRESSIVE MEDICINE.

MARCH, 1908.

SURGERY OF THE HEAD, NECK AND THORAX.

By CHARLES H. FRAZIER, M.D.

THE HEAD.

Surgery of the Posterior Cranial Fossa. The posterior cranial fossa until recent years has been looked upon askance by the surgeon. With the exception of those occasions in which the fossa was opened in operations for disease of the mastoid cells or secondary abscess there were but few attempts to treat surgically any other lesions. More accurate localization on the part of the neurologist and a better understanding on the part of the surgeon of the causes of shock in operations upon the brain and the adoption of suitable preventive measures have made it possible and justifiable to explore this field with reasonable safety and an encouraging measure of success. Those who are interested in this subject may read to advantage the papers of Krause[1] and Borchardt.[2] I have selected these two for review as representing the most notable contributions of the year upon this subject.

Borchardt collected 152 cases of intradural tumor of the posterior fossa. These are divided into two groups, the intracerebellar, involving the substance of the cerebellum, and the extracerebellar, those adjacent to the cerebellum, including tumors of the cerebellopontile angle. The first group he further subdivides into (1) neoplasms, which include gliomata, sarcomata, myxomata, and such modifications as gliofibromata, gliosarcomata, and fibrosarcomata; (2) cholesteatomata; (3) cysts; (4) infectious granulomata, tuberculosis, and gummata. Cholesteatoma is not a very favorable lesion for surgical intervention, owing to the multiplicity of lesions and to the almost inevitable recurrence.

On the other hand, the infectious granulomata offer a more hopeful prognosis, though surgeons are not altogether of one mind as to the

[1] Archiv f. klin. Chir., Band lxxxi, Heft 1.
[2] Ibid., Theil ii.

propriety of operating upon a *gumma*. V. Bergmann, for example, was disposed to regard operation as a questionable procedure. However, of 15 cases of gummata, 9 patients completely recovered after operation, and of 3 cases of pachymeningitis, 2 recovered. If we admit the propriety of operation, how long should one persevere with internal treatment before the question of operation is considered? I agree entirely with Borchardt's treatment of this important problem. It is impossible to lay down any hard and fast rule applicable to all cases. Thus, Horsley places the limit at three weeks, Starr at three months, others at six weeks. One's decision must be influenced by the peculiarities of the individual case, whether the symptoms are developing rapidly or slowly, whether the lesion is responding to internal treatment. And, above all, it is important that the antisyphilitic remedies be given a fair trial and administered to the maximum of the patient's toleration. One should incline toward operation (1) if the condition is progressive despite internal treatment; (2) if life is endangered, declining to operate upon those with basilar or spinal lesions and those with grave complications of the internal organs. Gummata of the cerebellum are in fact quite rare; of the 2 operative cases on record, but 1 of these recovered. We are confronted with an even more difficult problem when we come to discuss the indications for operation in tuberculomata. Here we must take into consideration the fact that in many cases there is not only more than one lesion in the cerebellum, but others in the brain, and perhaps some in the internal organs. Statistics taken from the autopsy table are, of course, misleading. Borchardt includes among the contraindications meningitis, multiplicity of brain lesions and advanced tuberculous lesions in other organs. Tuberculosis of one other organ should not unqualifiedly prohibit one's undertaking an operation.

TUBERCULOMATA. Unfortunately the results of operations for tuberculous lesions of the posterior fossa have been lamentable. Of 20 cases, 12 died of shock, and of the eight survivors, 3 died within two months of miliary tuberculosis, 2 lived four months, 1 nine months, and 2 apparently recovered.

TUMORS. Coming now to tumors proper, we tabulate the statistics from Borchardt's 101 cases:

	Per cent.
Died	60
Improved	15
Recovered (decompressive operation in which no tumor was found)	5
Recovered (tumor found and removed)	12
Unimproved	4
Results unknown	4
Total	100

In addition, there were 15 cases in which the decompressive trepanation or partial extirpation alleviated the patient's condition for months.

Adding these 15 cases to the 101 cases above, we obtain the following percentages:

	Per cent.
Mortality	52.0
Improved	26.0
Recovered	15.0
Unimproved	3.5
Result unknown	3.5

This is a very creditable showing when one takes into consideration the technical difficulties, the usually rapidly fatal nature of the lesion, and the difficulties attending localization. I do believe, however, that in the hands of careful experienced surgeons who have attained proficiency and demonstrated their superiority in neurological surgery, including if you will such men as Horsley and Krause, a lower mortality may be looked for in the future. Whether these statistics represent the actual percentages or not, that 40 per cent. of a given number of patients suffering from a distressing and inevitably fatal lesion should be entirely or only partially relieved should be regarded, when taking into consideration the gravity of the operation, as a surgical triumph.

Cysts. In Borchardt's table there were 14 operations for cysts and 13 recoveries. The Neisser method of evacuating cysts by puncture does not commend itself to Borchardt. The operation should even go farther than evacuation, since so many cysts but represent cystic degeneration of tumors.

Cerebellopontile Tumors. Of the 20 cases tabulated by Borchardt, 3 and possibly 4 appear to have recovered, 1 a year later is considerably improved, in 1 a decompressive operation was performed, and the remaining 14 died.

Poppert's[1] experience is unique and his case of unusual interest, because of the existence and successful removal of two tumors from the cerebellopontile space. A large rectangular osteoplastic flap was reflected, exposing both hemispheres. There was some uncertainty before the operation as to whether the tumor was situated on the right or left side, and after the hemispheres were exposed it was noticed that the right side bulged considerably. When the dural flap was reflected and the hemisphere displaced toward the median line, a tumor about the size of a walnut was found and removed, and, much to the operator's surprise, a second one almost as large was discovered adherent to the pons and to the adjacent surface of the cerebellum. While the tumor was being shelled out the patient's condition became alarming, his face pale and breathing superficial. This condition was only transitory, however, and, with the exception of the fact that on the following day there was some difficulty in swallowing, the patient's convalescence was uninterrupted. Unfortunately, the atrophy of the optic nerve was so far

[1] Deutsch. med. Woch., 1907, Nr. 15.

advanced that vision could not be restored. The attacks of vertigo, headache, and the ataxia have disappeared. This report was made four weeks after the operation was performed.

Altogether, Krause has operated upon nine patients with lesions in the posterior cerebellar fossa. So far as one can tell from the context, two of these were cases of extradural abscess on the posterior surface of the petrous bone; one, a case of hydrocephalus of the fourth ventricle diagnosticated as tumor of the left cerebellar hemisphere, the operation was solely exploratory and the patient died five months later; a fourth, an exploratory operation for internal hydrocephalus; a fifth, an operable tumor of the cerebellopontile angle, successfully removed; and a sixth, an inoperable tumor with death following. An ineffectual attempt was made at removal. There is no description or statement as to the remaining three cases making up his total nine patients.

However, of the nine, three died: one as a result of pneumonia, and two of what he calls continued intracranial pressure. None, he says, died as a result of shock, hemorrhage, or infection, although it would seem as though death in Case 2 might reasonably be attributed to shock, as the patient died the day of the operation, having left the table in a state of collapse.

As Borchardt points out, the skeptical views to which v. Bergmann gave expression were more than justified by the results which had been obtained up to that time. Thus of 47 operations upon the cerebellum, in 32 the tumor could not be found or was inoperable, half of the patients died of shock, of 11 cases in which a radical operation was attempted only 4 recovered, and these not fully. Only one of four radical operations for tubercle was successful, and this patient had died nine months later of recurrence.

Technique of Removing Growths from the Posterior Fossa. Krause operates with the patient in the sitting posture, the head of the patient bent forward so as to make the region below the occipital protuberance quite accessible. The head must he held by an assistant and the anesthetizer must have an assistant to observe the pulse and respiration. He reflects an osteoplastic flap, using for this purpose the Dahlgren forceps, in such a way as to expose both the lateral and sigmoid sinuses. His opening is a unilateral one. The flap is reflected downward and the head is inclined to one side in order that the exposed cerebellar hemisphere may fall toward the opposite side. The posterior surface of the petrous bone is then exposed, and with it a vein, which passes from the superior petrosal sinus into the cerebellum, the facial and auditory nerves. This vein should be ligated and divided. When there is reason to believe the tumor is in the hemisphere and nothing can be seen on inspection, an exploratory incision should be made into the hemisphere. In one case he incised both hemispheres so that he could see the arbor vitæ at a depth of 3 cm.

In those cases in which there is reason to believe the lesion is a hydrocephalus, involving the fourth ventricle, the ventricle should be tapped. Krause has practised this upon the cadaver and did not find it difficult. A small cannula is directed slowly toward the median line until fluid escapes. In cases of pressure upon the cervical cord he considers it quite feasible to expose the medulla oblongata, the adjacent part of the cerebellum, for the purpose of relieving pressure or removing tumors. It is important when operating in this region to avoid any jarring, and therefore the chisel should not be used.

The technique which Borchardt follows corresponds very closely to that of Krause, Schede, and Kocher. He prefers an osteoplastic flap and makes a larger opening than the others. He does not regard it, as do others, a very serious matter if the rim of the foramen magnum is removed. The thick membrane (atlantoöccipitalis) offers excellent protection to the dura and underlying structures.

In referring to the various sources of hemorrhage he calls attention to the one or more sinuses that may be found in the neighborhood of the mastoid process. Those who have had any operative experience in this region will not need to be reminded of the tremendous hemorrhage that may occur when they are opened. One of these enters the foramen mastoideum and empties into the sigmoid sinus. There is the greatest variation as to the size, number, and position of these sinuses. In some cases the lumen of the sinus may be as large as that of the sinus sigmoideum. Besides the mastoid emissary, there are numerous emissary veins in the region of the occipital protuberance; these also vary in size and number, and may cause alarming hemorrhage.

Various measures have been resorted to to control bleeding from this source; Borchardt uses ivory or wooden pegs. I have used Horsley's wax in some cases, wooden pegs in others, and at times been successful in closing the sinus by crushing the bone between the blades of a rongeur forceps. Exploration should include, according to Borchardt, not only inspection and palpation, but puncture and, if necessary, a free incision into the substance of the cerebellum.

The method of procedure in cases in which the cerebellum protrudes so that the dural wound cannot be closed is discussed. Borchardt does not approve of leaving the dura unsutured, and regards tapping the ventricle as unnecessarily dangerous; he prefers to remove as much of the cerebellum as may be necessary. The greatest dangers of the operation are shock, prolapse of the brain, and infection. The dangers of shock are minimized if the operation is done in two stages. Whenever possible, drainage should not be employed, as it increases the danger of infection. As a preventive measure the wound should be irrigated, according to Horsley's practice, with hot sterile salt solution, in order to prevent the brain becoming chilled.

My own experience, in some fifteen operations upon tumors of the

posterior fossa, has led me to conclusions, as to the technique, similar in many respects to those of Krause and Borchardt. It is very difficult to find a position for the patient which meets every indication. With operations upon the cerebrum every portion is accessible when the patient is in the vertical position. This position, however, is absolutely unsuitable for cerebellar operations. The desiderata are (1) elevation of the head (to control hemorrhage); (2) flexion of the head (to make the base of the skull and way of approach accessible); (3) the avoidance of any position that will embarrass respiration.

The position which I find more nearly meets all the indications is one in which the patient reclines on the side, with head flexed and the table at an angle of 35 to 40 degrees. I do not understand Borchardt's objections to leaving the dura unsutured. In decompressive operations upon the cerebrum we frequently remove a portion of the dura altogether, and there is no reason why the dural wound should be absolutely closed when operating upon the cerebellum. The effects of the operation will be greater and more lasting when a permanent opening is established. Krause's recommendation to tap the fourth ventricle is a perfectly proper one, though dangerous in inexperienced hands. I do not agree, however, with the recommendation of Borchardt to use the osteoplastic flap. This adds to the difficulties of the operation, and is regarded by many as unnecessary. The cerebellar hemispheres are so well protected by a thick flap of fascia and muscles that it is not necessary to replace the bone; futhermore, many of these operations are decompressive in character and do not admit of the bone being replaced. Borchardt does not regard the removal of the rim of the foramen magnum as a very serious matter, and while this may have been his experience, it is certainly wiser to leave the rim intact, as in so doing there will be less danger of injuring the medulla.

Removal of a Portion of Cerebellar Hemisphere. The propriety of removing a portion of the cerebellar hemisphere to facilitate exposure or to enable one to close the dural flap has been a subject for debate among the neurologists of this and other countries. The matter was precipitated by the report of a case in which I resected about one-third of a cerebellar hemisphere in order to obtain a satisfactory exposure of the cerebellopontile angle, and suggested the propriety of this procedure as entailing less risk than the bruising or possible laceration which would come from more or less forcible retraction of the parts necessary for exposure of the depths of the fossa. The patient in question was a young man who presented symptoms very suggestive of cerebellar tumor; there was intense agonizing headache, choked disk, optic neuritis, and marked vertigo and ataxia. In 1903 a suboccipital craniectomy was performed, and for reasons already stated one-third of one cerebellar hemisphere was removed. Within a week of the operation the headache and vertigo had disappeared and his vision was eventually restored.

This patient was examined last in November, 1907; he was then the picture of health, and apart from the fact that once in a while his gait was somewhat unsteady (according to his own report, but not as a result of our examination), he presented no signs of a cerebellar lesion.

In Victor Horsley's address before the British Medical Association he said, speaking of the possible compensatory repair of the cerebrum and cerebellum: "It has assumed a particular importance in the present subject because of Frazier's proposal to extirpate the lateral lobe in preference to pushing it aside by displacement for the purpose of reaching deep-seated tumors." Horsley recognizes the fact that the cerebellum may be considerably bruised during the manipulations necessary for removal of large tumors, but disapproves of extirpation as a measure of convenience. As a matter of fact, I did not propose the removal of an entire lateral lobe, as implied by Horsley's quotation, but only a portion of it, and while the former might be regarded as an unnecessary mutilation, the latter I still maintain is a justifiable procedure.

Borchardt considers the question so important as to be worthy of serious discussion. He refers to Luciani's experiments upon animals from which one-half of the cerebellum was removed; there was marked disturbance at first, but within four weeks there was a gradual compensatory restoration of function. There persisted, however, a cerebellar ataxia. These results agree with the clinical observations. Atrophy or congenital defects of only one-half of the cerebellum may be attended by no serious functional disturbances. Both the clinical and experimental observations only go to show the power of one portion of a hemisphere to compensate for that which either by its removal and atrophy no longer plays a part in the functional activities of that hemisphere. What is true of the compensation of a part of one hemisphere for another is to a certain extent true of compensation of one entire hemisphere for another. Our knowledge of these facts Borchardt applies to the question under discussion. He was inclined at first to agree absolutely with those who opposed my proposal. He has since changed his mind, and now not only sees no objection to the removal of as much as half of one cerebellar hemisphere, in appropriate cases, but has resorted to this procedure himself on two occasions. In one case he removed one-third of one hemisphere to make it possible to expose an acoustic tumor. There was some exaggeration of the ataxia after the operation, but in time the ataxia became by degrees less and less marked.

In his discussion upon this subject Borchardt refers to an interview which he had with Sachs during the past summer. In referring to a contribution[1] by the latter on the subject of cerebellar tumors, I find he makes the following comment upon the propriety of the procedure under discussion. I have already reviewed the opinions of several surgeons,

[1] Medical Record, December 2, 1906.

and it is interesting to contrast those of such a well-known neurologist as Sachs: "I believe I am not the only one among the American neurologists who feels a peculiar aversion to removal or mutilation of any part or area that is not distinctly diseased, and I for one should hesitate to advise such a procedure, *unless the symptoms point with absolute certainty to the presence of a neoplasm in a definite region and unless when the tumor is found it proved to be of such size and so conditioned that it can be removed.* It does not ease one's conscience particularly to have removed a portion of the lateral lobe of the cerebellum to come down upon the tumor and then to find that the tumor cannot be enucleated; moreover, it is well to remember that in cerebellar operations the danger from postoperative hemorrhages is greater than in operations for removal of other intracranial neoplasms. No doubt the proximity of the medulla has much to do with this, and not a few cases of cerebellar neoplasm that have been operated upon have died suddenly two or three hours or several days after operation from causes unknown or unsuspected."

While time and space will not permit of minute analysis of Sachs' criticism, suffice it to say that the conditions under which in his opinion a portion of the cerebellum may be removed are practically prohibitive, inasmuch as in the majority of cases there is more or less uncertainty as to the precise situation and precise nature of the tumor. Inasmuch as the recommendation to remove a portion of the cerebellar hemisphere was made solely to facilitate exploration, or rather the removal of a tumor, Sachs' criticisms are not to the point.

The Hypophysis. That few operations have been performed upon the *pituitary body* may be explained upon anatomical and physiological bases. Yet when we consider how the surgery of the ganglion of Gasser has been mastered, and how short the distance separating the ganglion and the hypophysis, the difficulties in exposing the latter should not be considered insurmountable. Physiologically there is still some uncertainty as to how necessary this small body is for the maintenance and prolongation of life. To review the literature of experimental observations is as confusing as wandering in a maze, yet one comes out with the impression that, in spite of conflicting testimony, the hypophysis must be regarded as essential to the preservation of health, and, therefore, cannot be altogether dispensed with. In this respect an analogy may be drawn between the thyroid gland and hypophysis. If, therefore, the removal of the latter should become in the future an established procedure in the treatment of *acromegaly*, the operation will consist in a partial rather than complete excision.

The first attempt to remove the hypophysis with which I am familiar was made by Caton and Paul in 1893. A decompressive operation was performed upon a patient with acromegaly, with the intention, when the patient's condition warranted, of removing the hypophysis. The

pain was almost entirely relieved by the decompression, but the condition of the patient did not improve sufficiently to justify a radical operation. Since that time a few more operations have been performed, and surgeons have been striving to elaborate upon the cadaver the procedure most fitting for the living subject. With these preliminary remarks we may proceed to review the more recent papers, particularly one by Moschowitz based upon his observations upon the cadaver, and another by Schloffer, who distinguished himself by successfully removing a hypophyseal tumor. I would also call attention to the first of Schloffer's contributions on this subject, reviewed in PROGRESSIVE MEDICINE, March, 1907.

Moschowitz[1] has had no opportunity to perform the operation upon the living subject, but he ventures to publish the technique he has elaborated upon the cadaver, because it resembles very closely that employed with success by Schloffer. There may be said to be two ways of approach, the intracranial and the extracranial, and the former may be further subdivided as extradural and intradural. The extracranial method implies an approach through the anterior or middle fossa. Because the hypophysis is hemmed in by such important structures as the cavernous sinus, the internal carotid artery, the third, fourth, fifth, and sixth nerves, this operation must be exceedingly difficult and hazardous, and inasmuch as the opening of some of the sinuses communicating with the nose cannot always be avoided, there is no positive assurance against infection. The extracranial methods imply usually an approach through the sphenoidal sinus. To reach the base of the skull and the sphenoidal sinus three routes have been suggested: one through the nasal cavities (v. Bruns), a second through the hard and soft palate (Gussenbauer), and a third by a subhyoid pharyngotomy (v. Langenbeck). Unless some preventive means is adopted, meningitis is a danger common to all, and in the approach through the pharynx there is the additional danger of an aspiration pneumonia.

The essential features of the Moschowitz operation is the use of a cutaneous flap reflected from the forehead to close the opening in the cranial cavity, and thus protect the patient from the possibility of a meningitis. The following are the essential features: The operation is performed in two stages; at the first the nose is reflected downward, the septum and as much as necessary of the turbinates and ethmoid removed, the sphenoidal sinus opened, leaving intact the layer of bone intervening between the sinus and hypophysis. A cutaneous flap is then reflected from the forehead so as to cover in the exposed surface of bone. This flap is kept in contact with the bone by a tampon, and the nasal cavities are plugged with gauze. To obtain sufficient space in which to carry out the final steps of the operation, it may be necessary to resect

[1] Wiener klin. Woch., 1907, Nr. 26.

the anterior and inferior walls of the frontal sinuses. If these sinuses are opened, the mucous membrane should be removed. The second stage of the operation is not undertaken until the flap has "healed in." The apex of the cutaneous flap, which lies in the sphenoidal sinus, is dissected back, the underlying layer of bone removed, the intervening dura incised, and the hypophysis removed. The tip of the cutaneous flap is then applied to the space corresponding to the floor of the sella turcica and retained in place by a tampon of gauze. This operation differs from Schloffer's in that it is performed in two stages and provides a means of closing securely the cavity at the base of the brain by the implantation of a skin flap. This precaution is taken to protect the meninges from infection.

Schloffer's patient was a man aged thirty years. There was no evidence of acromegaly, the symptoms being intense headache, anemia, bilateral hemianopsia, loss of sexual power, and a very unusual condition, namely, the disappearance of all hair of the body except a little on the pubes and chin. The diagnosis was based on those symptoms and confirmed by the radiograph, which showed an enlargement of the sella turcica and the presence of a tumor which cast a shadow similar to that of the brain tissue. Schloffer selected the extracranial method of exposing the tumor. The whole nose was reflected to the right, all the turbinated bones and septum removed, as well as the inner wall of the orbit up to the optic foramen. The nasal process of the superior maxilla and the inner wall of the antrum of Highmore were excised and the ethmoidal sinus cleaned out. After opening the sphenoidal cavity careful measurements were made in order to determine how near the operator was to the sella turcica. There was some doubt as to whether he had opened the sphenoidal fossa, which had been encroached upon by the enlarged sella turcica, or whether the ethmoidal labyrinth was still present. It was estimated from the radiograph that the sella turcica was 5.3 cm. from the root of the nose. According to this calculation the operator had reached the sella turcica, and upon perforating another layer of bone the tumor lay exposed to view. This opening was enlarged downward and to either side until it measured 1.5 cm. broad by 1 cm. high. The tumor was of a bluish color, soft and friable. In order to avoid injuring the neighboring vessels and dura a blunt instrument was used and the tumor removed piecemeal. About four-fifths of the growth was removed, the remainder being left behind because its removal might have damaged the dura. The cavity was packed with gauze saturated with balsam of Peru, the ends of the tampon being brought out through the nose after it was sutured in place. A histological examination proved the tumor to be an adenoma. A considerable amount of cerebrospinal fluid drained from the wound immediately after the operation, but the flow stopped on the fourteenth day. Apart from an attack of erysipelas the convalescence was uneventful.

The patient was relieved of his headache, but the hemianopsia persisted. An interesting and curious phenomenon was the effect of the removal of the hypophysis upon the growth of hair. Shortly after the hair began to grow everywhere. The explanation of this is hypothetical. Hyperfunction of the gland by destroying nutrition interferes with the growth of hair, and the excision of the hypophysis removed the influences deleterious to hair growth.

Schloffer[1] was surprised to find how easily, comparatively speaking, the operation proved to be. Apart from the hemorrhage, which at the first was quite profuse, there were no troublesome features. He regards it as but a little more diffiult than the excision of the Gasserian ganglion. A significant feature was the absence of meningitis, even though the patient developed erysipelas. Meningitis has always been a dreaded complication, and is usually mentioned in discussions as to the relative merits of the intra- and extracranial operation. The danger of infection in traversing the cavities of the nose and the sinuses is greater than if the tumor were approached by the intracranial method. There were no postoperative symptoms that suggested any disturbance of glandular function. This may be due to the fact that one-fifth of the gland was allowed to remain. And yet it must be remembered that this segment was the seat of an adenoma, and this of itself might have had some influence upon the functional activity of the gland. The analogy has been drawn between the hypophysis and thyroid gland in this connection. In both a small piece of the gland should be left in situ in order to avoid serious functional disturbances.

Braun[2] does not agree with Schloffer as to the impracticability of the approach by the temporal route. This view is based chiefly upon his studies on the cadaver, although he operated upon one case, a gunshot wound of the middle cerebral fossa, in which he was able with a sound to follow the track of the bullet wound through the cavernous sinus and explore the sella turcica. If the second division of the Gasserian ganglion is resected the operator will be able, by displacing the ganglion and cavernous sinus, to obtain an approach to the hypophysis more than a centimeter wide. By this means, Braun believes, it is probable that a tumor of the hypophysis could be removed just as readily as by the approach through the anterior fossa, and with less danger to the optic nerve and contents of the orbit.

A very well-devised plan for exposing the structures at the base of the brain, as, for example, the hypophysis, is the double flap method of Hartley.[3] This consists essentially in the reflection of a flap on either side with the bases or the pedicles at the temporal fossa. The incision begins external to the temporal ridge in the neighborhood of the stephanion,

[1] Wien. klin. Woch., 1907, Nr. 21.
[2] Deutsch. Zeit. f. Chir., Band lxxxvii, Heft 1 to 3, S. 158.
[3] Annals of Surgery, April, 1907.

crosses the ridge 1.75 cm. above the orbital margin, that is, just above the superciliary ridge, ascending gradually until a point is reached 3.75 cm. above the root of the nose. Here the incision crosses the median line and descends in a similar manner to a point behind the temporal ridge corresponding to the point of commencement. Another incision is now made across the vertex about 12 cm. long, in front of the precentral line and behind the coronal suture. This line begins and ends just to the side of the temporal ridge. Another incision bisects these two incisions just to one side of the median line. The bone is then divided along lines corresponding to the incisions in the scalp and the flap reflected to either side. This operation has an advantage over the method of Duret in that the frontal sinuses are not opened, and may be said to be superior to Kiliani's in that the bases of the flap are made where the bone is very thin. The base of Kiliani's flap is in the parietal bone at the convexity of the skull, where the bone is most curved and thickest.

Tumors of the Cerebrum. In the great majority of cases coming to operation the tumor is situated in the motor area. This is due to the fact that the tumors in this region are more easily localized and present localizing symptoms at an earlier period in the course of their growth. Thus, of 344 cases, 214 (63.52 per cent.) were in the motor area, 44 in the frontal, 34 parietal and occipital, and 52 in the cerebellum (Duret's statistics). If in regions other than the motor the tumor could be recognized and localized as positively and as accurately, more cases would be operated upon at an earlier stage and more cases would come to operation. Another reason, according to Tilmann,[1] for the unpromising results is the fact that many tumors are situated in a region of the brain to reach which would endanger the patient's life. Thus (quoting Brunwicke) in an examination of 209 cases with reference to their operability, either because of their nature or location, 90 per cent. of the tumors were found to be inoperable. Of the remaining 10 per cent., in two-thirds the seat of the tumor was not determined. There remained only 14 cases, or 6.5 per cent., that were operable.

These observations were made, no doubt, at the autopsy table at a time when the tumor was far enough advanced to take the patient's life. As I have had occasion to say before, the "autopsy method" of determining the operability is open to serious objection, and while the percentage of tumors suitable for radical operation will always be a small fraction of the whole, the actual percentage must be determined from the statistics of the surgical clinic and not the pathological laboratory. The mortality has fallen from 50 to 18 per cent. (Duret) and the number of cases benefited by operation risen to 64 per cent.

PALLIATIVE OPERATIONS. Saenger has always been a strong advocate of the decompressive operation. Although the operation had been

[1] Deutsch. Zeit. f. Chir., Band lxxxv, S 92.

executed many times before, his exploitation of the operation in 1902 had much to do with its establishment as a recognized procedure in the treatment of inoperable tumors. In a recent publication[1] he narrates his experience in a series of 19 cases in which this treatment was adopted. In 2 cases no results were obtained until the trephine opening was enlarged and more cerebrospinal fluid evacuated; in 2, the operation had no appreciable effect (the tumor was too large and death was imminent); in 1 case only—a basal tumor—was the condition of the patient unfavorably influenced by the operation. In all the others the beneficial effects of decompression were manifested.

According to Fink, in 30 out of 31 cases the choked disk subsided; his statistics show that in 73 per cent. of cases the eyesight was benefited for a considerable period, the mortality being 29 per cent. The latter is not a fair estimate of the operative risks, as proved by the series of 14 operations reported by Spiller and myself without a death. As to the site at which the opening should be established, the region of the tumor should, in Saenger's opinion, always be avoided. If localization is impossible he prefers the parietal region, since there is here less to be feared from *ausfalls* symptoms. In the case of cerebellar tumors one should wait some time before opening the dura. Such other measures of relief as lumbar puncture or tapping of the lateral ventricles are not to be compared with decompression.

Borchardt's attitude toward the decompressive operation is, to say the least, not an optimistic one, although he realizes that in some cases the patient may be very much relieved. Such was the case in a patient with an inoperable tumor who already had Cheyne-Stokes respiration and was in a desperate condition. After trephining the skull the patient recovered consciousness, spoke intelligently, and his headache disappeared. The results in cases of tumors are naturally only temporary; in cases of pseudotumors, as in meningitis serosa with hydrocephalus, the decompressive operation is more strongly indicated. There were in Borchardt's table 5 recoveries after exploratory operations. No tumor was found, but the patients recovered. These recoveries can be explained only by assuming that the lesion was not a tumor, but serous meningitis. There are several cases now under my observation belonging to this category. Of the 4 that I recall, one was operated in 1902, one in 1903, one in 1904, and one in 1907. These 4 patients have had no recurrence of symptoms, in 2 sight was restored completely, in one partially, and in the fourth optic atrophy was so far advanced at the time of operation that the patient remained totally blind.

Lewandowski recommends repeated lumbar puncture as an appropriate treatment for meningitis serosa, and some beneficial results have been recorded. This operation, though seemingly free from danger, has

[1] Klinische Monatsblätter f. Augenheilkunde, 1907, Band xlv, N. F. iii.

in some cases been followed by sudden death, particularly in cases in which there was increased tension within the posterior cerebellar fossa. Borchardt's experience (and the experience of many others) with this procedure has been very unsatisfactory, and he does not hesitate to express his preference for the apparently more formidable procedure, the decompressive operation.

In Bruce's[1] series of 5 cases, 2 died shortly after the operation and 3 recovered from the operation and were decidedly benefited by it. (1) A decompressive operation in the right motor area. The patient died the day of the operation and autopsy revealed a gliosarcoma of left cerebellar hemisphere. It was accessible, and if accurately localized could have been removed. (2) Decompressive operation over right Rolandic area. Patient died the following morning, and autopsy revealed a large tumor growing from the crux cerebri. (3) Decompressive operation right frontal region. Nature of lesion undetermined, but patient was relieved of headache, nervousness, ptosis, and diplopia. (4) Evacuation of cyst in left cerebellar hemisphere. Decidedly improved. (5) Decompressive operation in right temporal region in case of suspected tumor. Patient relieved of headache and vomiting.

Removal of a Large Tumor of the Occipital Lobe. The size of the tumor and the successful localization and removal together make Krause's[2] case worthy of mention. The operation was performed in two stages. At the first operation the osteoplastic flap was reflected, but the dura was not opened. At the second operation, two weeks later, the wound was reopened, the dural flap reflected, and a large tumor measuring 32 x 55 x 58 mm. removed. The tumor extended some distance down on the median aspect of the hemisphere, and Krause found that with his index finger he could distinguish between the normal and abnormal tissue. A noteworthy feature of the convalescent period was the hyperpyrexia and tachycardia. During the first twenty-four hours, although the patient was not shocked by the operation and had lost very little blood, the pulse became very rapid and scarcely perceptible and the temperature rose to 40.8° C. These conditions Krause attributed to the possible disturbance of the cardiac and respiratory centres which may have resulted from the manipulations attending the removal of the tumor. The pulse and temperature gradually returned to normal and the patient's convalescence from that time on was uneventful. Within three months of the operation he was able to travel about and attend to his business.

Technique of Removing Brain Tumor. In an article replete with excellent illustrations, Hartley[3] describes his technique and experiences in over thirty craniotomies. He prefers the circular saw to any other instrument. This is operated with a one-eighth horse power electric

[1] Annals of Surgery, April, 1907.
[2] Berliner klin. Wochenschrift, Band xliii, S. 1616.
[3] Annals of Surgery, April, 1907.

motor, encased in metal, weighing about eight pounds, and held in the hand of the operator. Five to seven holes are bored through the skull and the intervening sections of bone divided with the circular saw. From his observations upon 200 cadavers and 40 operations he found the craniotopographical method of Chipault the most comprehensive and generally accurate and best adapted to all varieties of operations. Chloroform is preferred to ether, and the operation is performed with the body at an angle of from 10 to 30 degrees. The blood pressure apparatus is used as a routine procedure. To control hemorrhage he uses a tourniquet of rubber tubing, and if there is much oozing he applies sponges wrung out of solutions at 100° to 115° F. Two veins from the longitudinal sinus and one from the sphenoparietal sinus may have to be ligated. In the majority of cases the flaps radiate from the temporal fossa as a base, because in this region the bone is thinnest. In some cases he recommends a bilateral flap, as in the frontal region, for the exposure of the hypophysis, or as in the occipital region, for the exposure of the cuneus and lingual lobes. Of his series of operative cases the majority were performed for the relief of lesions resulting from the immediate or ultimate effect of traumatism, *i. e.*, hemorrhages, adhesions, or cysts. There were only 5 cases of tumor; 2 of these, an endothelioma and a gliosarcoma, were successfully removed, the patients dying of recurrence thirteen months and two years, respectively, after the operation. In 1 case a cholesteatoma was found and successfully removed. In the 2 remaining cases the tumor was not found. Both patients died from the effects of the operation.

Küster[1] still seems to prefer the chisel to any other instrument in making the osteoplastic flap; while he has devised a chisel especially designed for the purpose, the effects in using the instrument upon the contents of the cranial cavity are none the less serious. It is somewhat surprising, therefore, that at this late date an article should appear from this distinguished surgeon in which he recommends the use of a chisel in the performance of craniotomies. The chisel has a flat, smooth, tongue-shaped flange on the under surface of the cutting edge for the purpose of displacing and protecting the dura. There is a flare in the middle of the shaft of the chisel, so that the plane of the handle is about two inches above the plane of the blade. This enables the operator to hold the chisel and to direct the force of the blow directly parallel to the plane of the skull.

Control of Hemorrhage. Hemorrhage is a factor which must always be taken into consideration in operations upon the cranium and cranial contents. The amount of hemorrhage which occurs in the average cranial operation is not as profuse as one would be led to believe by the statements of many writers, providing, of course, the proper precautions are taken; and the attending dangers are very much exaggerated. The postural treatment, and by that we mean operating with the patient in the

[1] Archiv f. klin. Chir., Band lxxxiii, Heft 1, S. 332.

erect or semi-erect posture, will suffice, as a rule, to keep hemorrhages under reasonable control. There are exceptions, however, as, for example, in operations upon the posterior cranial fossa where we have to deal with very profuse and alarming hemorrhage from the numerous emissary veins penetrating the skull. It would be an advantage in these cases to have further resources for controlling hemorrhage.

Recently, Dawbarn[1] has given us his experience with what he calls the sequestration method, or cordage of the extremities. The technique is as follows: A towel folded lengthwise is wrapped about each thigh close to the trunk, and upon this a rubber tube is tightened. The towel serves in a measure to prevent subsequent discomfort by spreading the pressure over a wider area. The degree of tightness is quickly learned by practice. It must nearly stop the venous but not the arterial current. Quickly the limb distal to the tourniquet grows dusky in color and there is obvious swelling also; after from five to ten minutes, according to the tightness of the cord, the softened pulse will indicate that we are ready to begin the operation. The congested limbs, however, are first warmly wrapped and hot-water bags placed about them. In most instances it will suffice to constrict the lower limbs, although in a few plethoric individuals the method has been applied to all four extremities. The ultimate return of so much blood into the general circulation ought not to be accomplished instantly. For the sake of the heart the cord should be loosened rather slowly, taking nearly as long to release as to accumulate with blood. Dawbarn assures us that there is no danger of gangrene if sequestration is practised only for a short period of time, as, for example, half an hour. If the operation must be prolonged the upper extremities may be constricted, at the same time releasing slowly the constriction from the lower extremities.

To control the reactionary hemorrhage, which would follow the restoration of pressure when the blood in the extremities is released, Dawbarn recommends the application to the wound surfaces of gauze sponges wrung dry out of actually boiling water. From his experience during the past two years in operations upon the head, neck, and trunk, in which sequestration anemia has been resorted to, he has found that not only does it not tend to cause shock, but rather prevents it, in so far as the sequestration controls hemorrhage, shortens the time of operation, and diminishes the amount of ether required. The effect of sequestration anemia upon the anesthesia was very striking; patients once anesthetized would remain completely under the effects of the anesthetic for a long time without the additional administration of ether. In one case the operation was continued in this way for three-quarters of an hour. It must be remembered, however, that there are certain contraindications to the use of this means of hemostasis, and therefore a reasonable degree of

[1] Annals of Surgery, February, 1907.

common sense must be employed in determining when to use and when to avoid it. The danger of subsequent thrombosis or embolism would be greater in cases in which the patients were recovering from infectious lesions, such as typhoid fever, and in patients with atheromatous vessels.

It is unfortunate that in his application of this method Dawbarn did not make any observations upon the state of the blood pressure. If, as he believes, beneficial effects are derived at the expense of lowering the blood pressure, we would be inclined to regard the method as questionable if not distinctly dangerous. Sudden alteration in the blood pressure or in the degree of intracranial tension is responsible for many of the serious respiratory and cardiac complications that so often lead to fatal results. Inasmuch, however, as Dawbarn reports as yet no unfavorable experiences, the method should be given further trial, as it may prove to be a valuable aid in selected cases.

Kredel[1] suggests a means of controlling *hemorrhage in the scalp* during craniotomies, somewhat similar to Heidenhain's method. The latter consist in the introduction of a continuous suture penetrating the thickness of the scalp, in such a way that when the suture was tied hemostasis was complete. The suture was introduced parallel and on either side of the line of prospective incision. Kredel's method differs in that the suture is tied over metal plates 1 cm. wide, 0.5 cm. thick, and 5 to 7 cm. long. These are curved somewhat, in order to conform to the shape of the head. For convenience' sake a groove may be cut on the external surface of the plate in which to receive the suture and prevent it from becoming displaced. Kredel's method might be said to be preferable to Heidenhain's only in that the sutures do not pucker the skin. Kredel has used this device also in other operations, as in the extirpation of a cavernous angioma.

Bloodless Operations on the Skull under Air Compression. Surgeons are familiar now with *Sauerbruch's chamber* and its application to operations upon the thoracic cavity. The expense and the cumbersome character of this contrivance have interfered unfortunately with its very general adoption. Sauerbruch continued his studies upon the effects of altered atmospheric conditions upon the solid organs, the liver, spleen, and brain. He found that he could render both the spleen and the liver practically bloodless when operating in the chamber in which there was increased atmospheric pressure. Unfortunately these conditions caused serious respiratory difficulties, probably by interfering with the action of the diaphragm. He then turned his attention to the effect of air compression upon the brain as a means of rendering the brain bloodless during operative procedures. He was surprised to see that under a moderate increase of atmospheric pressure there was practically no bleeding, either from the tissues of the osteoplastic flap, the dura, or the brain itself. And here

[1] Cent. f. Chir., 1906, Nr. 43.

again, however, he met with serious complications, which consisted chiefly in sudden respiratory failure, to be followed in a few moments by arrest of the heart action. The autopsy proved these fatal complications to be due to air embolism; in all probability, owing to the increased pressure in the chamber, the air was forced into the diploic veins in the bone and from thence into the general circulation. These symptoms usually appeared in the early stage of the operation before the trephine had entirely penetrated the skull. If the animals survived until the skull was opened the accident rarely occurred. The fact that the symptoms of air embolism did not appear after the skull was opened was due to the fact that the increased atmospheric pressure compressed the sinuses and thus prevented air emboli from getting into the general circulation.

The influence of air compression upon hemorrhage in his experimental craniotomies was striking. With a pressure of 10 to 15 mm. Hg. the hemorrhage would be controlled both in the small and large veins. Bleeding from the arteries and all the tissues including the bone was controlled when the pressure was increased to 70 mm. Hg. Even when the longitudinal sinus was divided there was not the slightest hemorrhage. If the pressure was gradually reduced, the dura would return to the level of the internal table of the skull, the pulsation of the brain reappear, and the vessels begin to fill up and bleed freely.

These observations prove conclusively that, provided the danger of air embolism can be eliminated, the field of operation on the brain may be made bloodless by this means. Sauerbruch continued his studies farther to determine the effect of air compression upon the brain structures. He made an exploratory incision upon the brain and then gradually increased the pressure from 10 to 100 mm. Hg. At first the bleeding was profuse, but finally the wound was perfectly dry. He endeavored to determine how far beneath the cortex the effects of air compression penetrated the brain, and found in his experimental cases that there was very profuse bleeding if the incision was made down as far as the base of the skull, showing that the deeper circulation of the brain was uninfluenced. This phenomenon may have some bearing upon the question of cerebral pressure in that the cortical anemia will affect the vessels more or less distant only to a very slight degree. As to the direct application of this method of hemostasis, Sauerbruch found that to maintain a high pressure a very complicated apparatus was required, but for all practical purposes 20 to 30 mm. Hg. is sufficient, and this degree of pressure may be obtained without much difficulty and without the slightest unpleasantness or ill effects upon the operator. After many attempts he hit upon two methods, the adoption of either of which would prevent air embolism. One method consisted in making a small trephine opening under normal pressure, plugging the edges of the bone section with wax, and then gradually increasing the pressure sufficient to collapse the dural sinuses. When the dural sinuses were closed, the opening in the bone might then be enlarged with

impunity. The second method is practically the same as the first, differing in that the opening in the skull is made with a very small drill instead of a trephine.

Cerebral Pressure. Quite the most important feature in Sauerbruch's studies upon the effect of air compression upon the brain is the discussion of cerebral pressure. Those who may be interested in this question find an excellent review of the whole question, including the views and investigations of the more important contributors to this subject. Sauerbruch believes that his method of observation, that is, with the compressed-air chamber, offers greater possibilities for studying directly the effects of brain pressure than the method of inspection through a window, as practised by Donders. By gradually increasing the degree of atmospheric pressure up to 50 mm. Hg. he was able to reproduce the typical picture of *stauungshyperämie*, or congestion, which according to the Kocher scheme is the first stage of cerebral compression. However, there were in his experiments no symptoms during this stage except on three occasions, when there was a marked retardation of the pulse. By increasing the pressure from 50 to 110 mm. Hg., he produced the second stage of cerebral compression, the stage of anemia, with slowing of the pulse, deep snoring respiration, loss of consciousness, tremors, convulsions, etc. Attention is called to the fact, and upon this point considerable stress is laid, that some of the symptoms appeared before the transition from the hyperemic to the anemic stage.

The following experiment was interesting in its bearing upon the effect of anemia upon the production of pressure symptoms: A dog was trephined over the region of the medulla, the atmospheric pressure was increased from 10 to 30 mm. Hg., when the pulse fell from 96 to 62 and the respirations from 20 to 12. The veins of the dura had collapsed; when the dura was opened, the brain bulged somewhat, as showing increased tension, and this was followed by some improvement in the respirations and pulse. The brain surface presented the picture of *stauungshyperämie*. The atmospheric pressure was then increased to 40 mm. Hg., when additional symptoms of compression appeared, then to 60 mm. Hg., when the respirations became infrequent, pulse rapid and weak, and finally to 70 mm. Hg., at which stage the animal died. Throughout this experiment the stage of anemia was never reached, and yet the animal exhibited many of the symptoms for which an anemia has been held responsible, and finally died. In a second experiment, conducted in the same way and modified by the injection of saline solution and compression of the aorta for the purpose of increasing blood pressure, it was noted that while the circulation of the medulla was very much improved, the condition of the animal and the associated symptoms were in nowise affected. The results of his investigations upon the effects of circulatory disturbances upon the brain pressure may be summed up as follows:

1. That the sinuses of the dura were easily and completely compressed.

2. That extradural pressure forces the dura away from the skull before any changes in the vessels appear. The latter appear later, and begin with collapse first of the large and later of the small veins.

3. Extravascular pressure within the skull will cause collapse first of the veins, then of the capillaries, and if sufficient, pressure is used, even of the smallest arteries. Between the periods of venous and capillary collapse there appears the stage of congestion. The symptoms attributed to vascular disturbance were precisely those which were produced by other means in Kocher's laboratory. Finally, pressure symptoms were observed in spite of the fact that there was no anemia.

In so far as the successive stages of hyperemia and anemia were demonstrated by increasing atmospheric pressure, Sauerbruch's observations agree with those of Kocher, differing in this one important respect, however, that in some cases fatal symptoms developed before the stage of anemia was reached. If this be true, anemia cannot be the causative factor in the production of these symptoms, or, as Sauerbruch suggests, it is possible that the anemia observed in experimental work may only be superficial, that is, confined to the cortex, the remainder of the brain being the seat of congestion.

Another observation of Sauerbruch's not in conformity with the observations of others is the apparent independence between the blood pressure and intracranial tension. We have been led to believe that there was a compensatory increase of blood pressure under conditions in which there was a gradually increasing intracranial tension, and that the degree to which blood pressure was raised was proportionate to the degree of intracranial tension. Certainly, both experimentally and clinically, this relation between the brain and blood pressure has been frequently observed. We would be inclined to feel that more convincing evidence than that supplied by Sauerbruch's experiments must be presented before our views upon this phase of brain physiology could be so radically changed.

Compressibility of the Brain. Whether the diminution in the contents of the cranial cavity is due to the displacement of cerebrospinal fluid or compression of the bloodvessels, especially the veins and sinuses, or, finally, to the mechanical compression of the cerebral tissue itself, is a much mooted question in the discussion of the factors concerned in cerebral pressure. It is generally conceded that the first two factors are each responsible, but the compressibility of the brain is not generally admitted; in fact, this was the principal cause of disagreement in the discussion between von Bergmann and Adamkiewicz. The latter has claimed that, as to its compressibility, the brain may be compared to a sponge. Sauerbruch endeavored to confirm or disapprove this phenomenon by observing the behavior of the brain in his air compression apparatus. His experiments on this point were intensely interesting, and led him to take a positive view as to the compressibility of the brain. He found

that the brain was more compressible when the dura was open than when it was intact, and that the compressed area was circumscribed with the dura intact and quite diffuse when the dura was opened. This compressibility of the brain he believed to be entirely independent of the condition of the bloodvessels, as the same results were obtained in cases in which the animals were exsanguinated. The diminution in volume of the brain was entirely independent of the blood pressure, and was associated with the usual symptoms of brain pressure, which would correspond to the stage of *stauungshyperämie.*

In all forms of cerebral pressure Sauerbruch attaches great importance to the pure mechanical displacement of the brain and compression of its tissue. The resulting functional disturbance of the cells, the result of compression, plays a greater role than has hitherto been accorded it. In the essential points Sauerbruch favors the theory of Adamkiewicz, in that he regards the compressibility of the brain as proved, and the presence of cerebrospinal fluid as unimportant. He found that both local and general cerebral pressure could occur quite independent of the cerebrospinal fluid. Although in those cases in which the cerebrospinal fluid was present in excessive quantities, or under an excessive degree of pressure, considerably less extradural (local) pressure was sufficient to cause symptoms of cerebral pressure than was the case under normal conditions.

Cranial Defects. I have on several occasions referred to the propriety and technique of the closure of cranial defects; the matter is brought to our attention again by a contribution of Borchardt.[1] It is scarcely necessary to remind the reader that there are two schools of thought as to the indications for closure of cranial defects. There is a wide divergence of opinion based on theoretical, experimental, and clinical evidence, and until there is some unanimity of results this state of confusion must persist. Kocher, Borst, and Horsley, for example, take the stand that complications and sequelæ are more apt to develop if the cranial defect is closed, while Koenig, Müller, Fischer, Kaposi, and Borchardt are equally confident that these complications may be avoided, or, if present, may be relieved by primary or secondary osteoplastic methods. The different results that are observed may be due to the fact, as Borchardt suggests, that the injuries do not always affect the same part of the skull. Borchardt is very skeptical as to the effect of adhesions as an etiological factor; in fact, he goes even so far as to say that they may be disregarded. The more important factor he believes to be the sudden increase of intracranial tension in the portion of the brain protruding through the defects (whether due to straining, vomiting, or any other cause). When this takes place, adhesions, if present, may aggravate the conditions by making pressure or traction upon the protruding brain surface.

[1] Verhandlungen der Deutschen Gessel. f. Chir., Band xxxv.

There are three factors operative in the regeneration of bone in cranial defects—the dura, the diploë, and the periosteum. If the dura has not been injured or disturbed the defect may be repaired without any further intervention. If the dura has been removed and the edges of the dural wound become adherent to the diploë and periosteum at the margin of the defect there well be no regeneration of bone, inasmuch as each of the three essential factors has been shut off by adhesions. The technique which Borchardt recommends differs from the Müller-Koenig method in that his flap is composed only of periosteum and a thin layer of bone. He does not believe the overlying scalp to be essential for the nourishment of the flap. This modification of the Koenig-Müller operation is simpler, inasmuch as it does not involve the necessity of finding a cutaneous covering for the region from which the skin-covered osteoplastic flap was transplanted. He discusses the relative merits of the methods in question somewhat at length, although in reviewing them the reader is not convinced that one method has any special advantage over another. Neither of them are difficult of execution, and both seem to be equally effective. Borchardt reports favorable results in the 12 cases upon which he operated, one of them being a child only twelve days old.

In the majority of his cases the layer of bone was applied directly to the dura, and if the dura was absent, directly upon the brain. With the exception of one case all the patients complained of slight headache, and in one case the symptoms were in nowise affected by the operation; on the other hand, no untoward results were noted as the result of adhesions which may have formed between the bone on the one hand and the dura and brain on the other. In addition to being easier, the method which is employed has certain distinct advantages over that in which the flap is reversed so that the periosteum faces inward and the raw surface outward. One of the disadvantages of reversing the flap is the possible tension, which, by interferring with the circulation, may lead to necrosis of the bone. Another is the inappropriateness of the method in those cases in which there is a granulating wound surface, as in cases previously infected. The repair of the defect will take place very much more quickly if the exposed surface and not the periosteal surface of the bone is applied to the granulation tissue. In one of his cases, influenced by Kocher's views as to the undesirability of rapidly closing the defect in the skull after injuries to the brain, Borchardt used a periosteal flap, with the idea that this would afford immediate protection to the brain, and subsequently sufficient bone would be regenerated to repair the defect. He was disappointed in the result in that the symptoms were not relieved. Whether they were due to the fact that the defect was not closed, or to the cicatrization of the brain following so severe an injury, he was unable to determine. Suffice it to say that in the majority of his cases the untoward symptoms developed before the defect had been repaired.

So positive is Borchardt in his views upon this subject that he does not

hesitate to say that the very best protection against complications that may arise from an injury to the brain is early and well-executed bony closure of the defect. As to the details of the technique, it is necessary above all that the scalp should completely cover the defect, as the bone flap need not be very thick. It is not necessary to chisel as far as the diploë; in fact, it is well to avoid the latter, inasmuch as there will be less bleeding. He uses for this purpose the bayonet-shaped chisel, somewhat similar to the instrument which is recommended by Küster. Care must be taken to prevent the edges of the periosteum from falling in between the edges of the bone defect and of the bone flap. In order that the edges of the bone flap may unite with the edges of the defect no tissue should be allowed to intervene. In cases of long standing the bony margins of the defect should be freshened, and in all cases the attempt should be made to bring the edges of the bone flap into apposition with the edges of the defect. Drainage should be employed in order to prevent the accumulation of blood, that is, beneath the periosteal bone flap.

CRANIAL DEFECTS AND EPILEPSY. I have discussed at various times more or less fully the relation of cause and effect between cranial defects and epilepsy. There is still much uncertainty and conflicting evidence. Additional information gathered here and there may enable us to take a positive stand either for or against the propriety of closing defects after all cranial injuries. For this reason I have reviewed the following data derived by Müller[1] from a perusal of 100 cases bearing on this subject: "The location of the defect apparently bears no relation to the appearance or non-appearance of genuine or Jacksonian epilepsy or other brain symptoms. It is difficult to reconcile this fact with the opinion of Hughlings Jackson, who, in 1864, was the first to call attention to focal epilepsy, and who maintained that it is invariably due to organic disease of some kind adjacent to the fissure of Rolando. Among these cases of Jacksonian epilepsy defects of the frontal, parietal, temporal, and occipital bones were noted on both the right and left sides.

As to *age*, the oldest patient who developed epilepsy was forty-six. The youngest suffering from this disease following a traumatic defect was eighteen months of age (reported by Bunge). The *size* of the defect seems to have little bearing on the probable occurrence of secondary symptoms. The largest defect was one reported by Schroeder, following the extirpation of an epithelioma of the vertex of the skull in a man of seventy-six. This defect measured 4 x 5½ inches. He remained entirely free from symptoms (after one year and five months). The smallest defect complicated by fits was the size of a quarter in the left frontal bone in a man of twenty-four. The case in which the largest quantity of brain tissue was lost suffered from headache and dizziness on stooping, but no other symptoms (age sixteen years). Another case in which only

[1] Wisconsin Medical Journal, June, 1907.

a very small quantity was lost developed severe attacks of epilepsy within two months. Out of 13 available cases, the shortest period in which epilepsy occurred, from the time of the injury, was one month; the longest, fifteen years. Excluding the latter case, which is rare, the average latent period was six and five-eighths months. In regard to *infection*, the deductions may be erroneous, but in this list, in the majority of instances, when the cranial defects were complicated by infection, the cases turned out badly. Most of them were followed by headache, giddiness, and many by epilepsy. In the cases healing by primary union the reverse was true; a few suffered from epilepsy, etc., but the majority remained free from symptoms. Out of 37 cases of traumatic skull defect, with an average observation period of three years and three months, 12 remained well, 12 suffered from a variety of ailments, 12 developed epilepsy, and 1 died of meningitis. These deductions agree with Kocher's report, in which out of 13 cases only 5 remained well. Of von Bergmann's cases,[1] 4 were epileptics and 2 out of 11 were incapacitated. On the other hand, according to Brewitt,[2] of 38 cases treated in Prof. Korter's clinic, in which the opening in the skull was closed primarily, 24 entirely recovered, 2 had slight disturbances, 2 were unable to earn a living, 2 died, and 2 disappeared. In 4 cases the defect was closed by a secondary plastic operation; 3 of them entirely recovered, and 1 was cured of epileptic seizures.

Epilepsy. There is little to be gathered from the more recent literature on the subject of the operative treatment of epilepsy. We wade through lengthy articles upon the subject with the hope of deriving information which will give us a better understanding of the pathogenesis of epilepsy and of the effect upon these lesions of the various surgical procedures. In the majority of instances we are disappointed to find that the articles are nothing more than a rehash of those which have previously appeared, the basis of the article usually being the clinical report of one or perhaps more cases in which the seizures have been arrested for a limited period of time. The situation today does not seem to have changed from that of a year ago, when I remarked that the surgical treatment of epilepsy had resolved itself into a controversy between those in favor of and those who opposed Kocher's theory. The latter is in a measure a decompressive operation; it consists in the establishment of a permanent opening (ventilbildung). Krause recommends, in addition, excision of the cortical centre, a procedure inaugurated many years ago, but falling into disrepute because sufficiently accurate methods of localization were not resorted to. By cortical faradization it is possible to determine with precision the situation of the centre which is to be excised. I am inclined to favor Krause's recommendation, which, although more radical and possessing

[1] Quoted in PROGRESSIVE MEDICINE, March, 1907, p. 192.
[2] Archiv f. klin. Chir., Band lxxix, Heft 1.

certain objections, may prove more effective in breaking the epileptic habit.

Auerbach and Grossmann[1] have reported somewhat at length their experience with a young boy, seven and one-half years of age, the subject of Jacksonian epilepsy. The operation was divided into two stages (although this seems to me entirely unnecessary); at the first stage the osteoplastic flap was fashioned and reflected and 0.5 cm. removed from the margin of the bone flap, as recommended by Krause. The second stage of the operation was not performed until three months later, when a subarachnoid cyst was found in the motor region. The situation of the cyst was positively determined by electrical faradization, which provoked reactions in the neck, arm, and face. A portion of the cortex, 30 x 15 x 5 mm., corresponding to the arm centre, was excised after the cyst had been evacuated and an exploratory incision made in the cortex to determine the presence or absence of a neoplasm. Three months afterward the convulsions recurred, only to disappear again, and the child has continued well for a period of six months. The paralysis following the incision of the cortical centre disappeared almost entirely, the left upper extremity was quite as strong as before the operation, although there was a little weakness in the facial muscles about the mouth.

In a case of Jacksonian epilepsy, Mumford,[2] upon reflecting a large osteoplastic flap from the left parietal region, exposed a large subarachnoid cyst. As the cyst was too extensive and elusive for excision, it was opened in three or four places and a serohemorrhagic fluid evacuated. The operation was concluded by carrying out Kocher's suggestion and removing the bone for decompressive purposes. The patient has had no recurrence of attacks fifteen weeks after the operation.

Traumatic Lesions. Hyperalgesic Zones as a Sign of Cranial Injury. For the first intimation of the occurrence of hyperesthetic areas in relation to diseases of the internal organs we are indebted to Head and Mackenzie. Since that time many others, especially Kocher, Sherrington, Lennander, Nothnagel, and Wilms, have made notable contributions. More recently, Vorschutz[3] has added to the list of lesions which may give rise to hyperalgesia injuries to the skull and brain. This symptom has been attributed primarily to a neuritis or perineuritis. The neuritis may be due, on the one hand, to an actual infection, as in cases of meningitis, or to trauma, as in cases of concussion. Thus, after a traumatic lesion of the brain the irritation is conveyed along the tract of the sympathetic to the carotid plexus, thence to the superior cervical ganglion, and from that *via* the rami communicates to the peripheral nerves. The upper four cervical nerves are intimately connected with the superior cervical ganglion.

[1] Münchener med. Woch., 1907, Nr. 10.

[2] Publications of the Massachusetts General Hospital, June, 1907.

[3] Deutsch. Zeit. f. Chir., Band lxxxviii, Heft 1–3.

The more serious the injury the more widespread the hyperesthesia; after moderate traumatism it may extend only to the second cervical and in graver cases to the fifth and sixth segments. After a unilateral lesion we would expect to find only a unilateral hyperalgesia. Therefore, bilateral hyperalgesia implies an injury to both hemispheres. Knowledge of this phenomenon might be applied to advantage in cases of gunshot wounds, when the question may arise as to whether the bullet had passed beyond the median line.

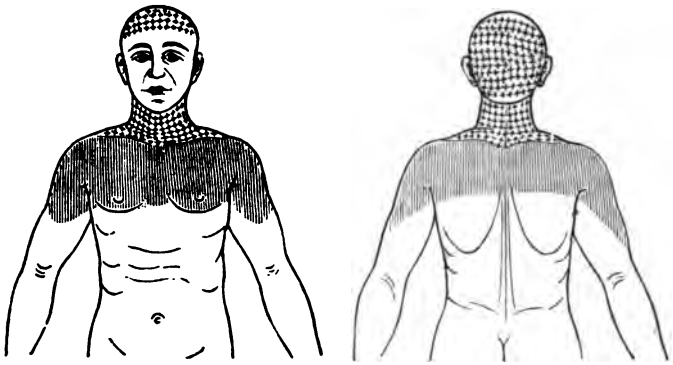

FIG. 1.—Representing the areas of hyperesthesia in a gunshot wound. The zones designated with a + were the most sensitive (Case 1).

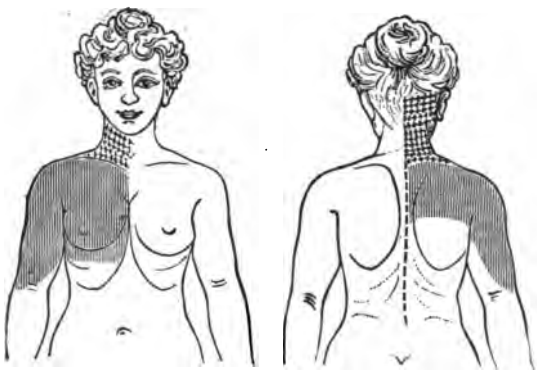

FIG. 2

FIG. 3

FIG. 2.—Area of hyperesthesia in fracture of the base of the skull with cerebral concussion (Case 2).

FIG. 3.—Area of hyperesthesia nine months after fracture of the base of the skull with concussion (Case 3).

To test for hyperalgesia one may stroke the head with the finger and if hyperalgesia is present the patient will draw the head away. If tested with the head of a pin, the patient will feel as though he were pricked with the point. Pulling the hair gently will elicit considerable pain, and the patient will be unable to distinguish between heat and cold. Subjectively the patient describes a sensation of tingling or pins and needles.

All complain of headache, sometimes deep-seated, at others referred to the surface. According to Head the dull, deep-seated pain which can be elicited by making pressure on the skull is due to involvement of the dura, while the referred pain is due to increased intracranial tension. Vorschutz does not subscribe to this view, as there were in some of his cases no signs of increased intracranial tension. The duration of the

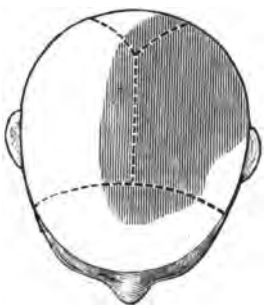

FIG. 4

FIG. 5

FIGS. 4 and 5.—Area of hyperesthesia in the distribution of the second and third cervical nerves in a case of cerebral concussion or basal fracture (Case 4).

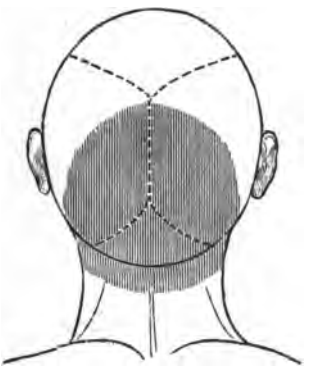

FIG. 6

FIG. 7

FIG. 6.—Area of hyperesthesia in the second and third cervical segments about six months after a cerebral concussion (Case 6).

FIG. 7.—Area of hyperesthesia one year after an injury to the head, either a concussion or a basal fracture (Case 7).

hyperesthesia is very variable. In some cases it was of comparatively short duration; in one instance it persisted for two years. The persistence of the sensory disturbance may be due to the continued irritation of scar or callous tissue. One should not confuse the hyperalgesia above described with the hyperesthesia, which may appear in the periphery after a cortical injury. The latter appears in the region corresponding to that presided over by the cortical centre, and is contralateral.

In the first of Vorschutz's cases, a gunshot wound, he was able to determine by the distribution of the sensory disturbances that the ball had not reached the base and injured the larger sympathetic ganglion. The sensory disturbance persisted for six months, and at that time might be described as a mild hyperesthesia as compared with the preëxisting hyperalgesia. The second case was a right-sided basal fracture with concussion. The hyperalgesic zones extended as far as the elbow and

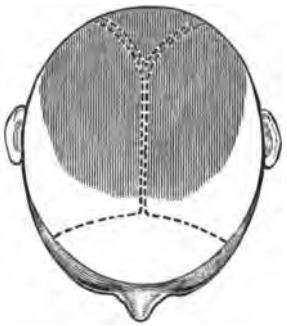

FIG. 8

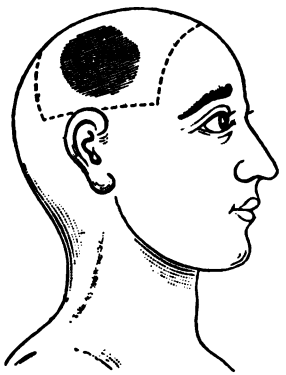

FIG. 9

FIG. 8.—Area of hyperesthesia after fracture of the base of the skull with concussion (Case 8).

FIG. 9.—Area of hyperesthesia several years after a fracture of the skull (Case 9).

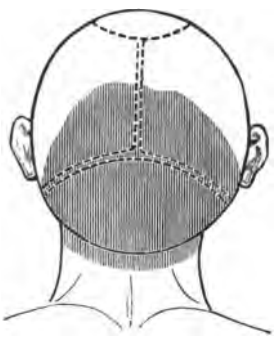

FIG. 10

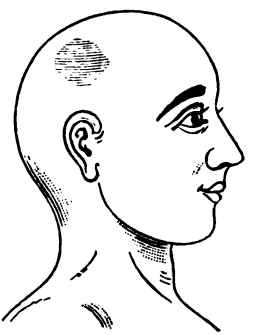

FIG. 11

FIG. 10.—Area of hyperesthesia following cerebral concussion (Case 10).

FIG. 11.—Area of hyperesthesia after cerebral concussion (Case 11).

below the breast as far as the distribution of the second dorsal nerve. There was considerable variation in the degree of intensity between the different zones, and the symptoms persisted more than a year. The third case was interesting as exhibiting the two sources of pain, one in the region of the parietal bone due to a basal fracture on the same side, and the other in the right arm due to a collection of blood upon the cortex. The hyperalgesia persisted nine months. Case 4 was a left-sided basal fracture with pain in the distribution of the second and third cervical

segments persisting more than a year and a half. In the fifth, a case of concussion, hyperalgesia was limited to the right side. It is difficult to account for a unilateral distribution in cases of concussion unless the pain is attributed to a contusion of the brain on the side in which the blow was inflicted. The sixth corresponded very closely to the fifth. The hyperalgesia continued more than a year and a half in the seventh case, and was due to concussion without fracture. In several cases a point of maximum tenderness was noted, and usually this point was the last to be relieved. Conversely, the region in which the pain persisted for the longest period was the point of maximum intensity. The eighth case was a basal fracture with bilateral zones of hyperalgesia, including an injury to both cerebral hemispheres with duration of pain, for four months. In the ninth case the patient had sustained, three years before, a unilateral basal fracture and a concussion. A hyperalgesic zone was found in the region of the parietal eminence. The patient was able to outline exactly the affected sensitive zone. No doubt at the beginning a large area, probably the distribution of the second cervical segment, was involved. The next case illustrates the importance of testing the sensibility of the skin when there is any doubt as to the existence or preëxistence of a cerebral injury. The patient had been regarded as a malingerer, but an examination revealed a zone of hyperalgesia involving part of the second and third cervical segments on both the right and left side. As typical of the sensitiveness of the skin, the patient was unable to stand the pressure of an ice bag even though the application of cold was agreeable to him. Further inquiry elicited a history of a fall in which the patient had struck the back of the head and sustained a contusion of both hemispheres.

The recognition of the hyperalgesic zones may be of great assistance when our opinion may be asked as to the probability of an existing or preëxisting cranial injury. The patient will frequently complain more or less constantly of headache, which is aggravated by pressure because he believes that strong pressure upon the skull must elicit pain. Without questioning the patient at all one may demonstrate the presence or absence of hyperalgesic zones. The presence of these zones may be interpreted as an evidence of a preëxisting lesion, but, in addition, determines as well whether one or both hemispheres were originally involved. Negative findings must not be interpreted as incompatible with preexisting trauma, since hyperalgesic zones are not a constant accompaniment of cranial injuries.

Cerebral Hemorrhage. In typical cases the diagnosis of meningeal hematoma is not difficult. It may be based upon the period of consciousness followed by a period of unconsciousness, upon the gradual appearance of sensory and motor disturbances, upon the evidence of increased intracranial tension, such as the slow, full pulse and stertorous respiration. These are the most constant symptoms, although there may

be in addition ocular phenomena, particularly dilatation of the pupil and choked disk, vomiting, aphasia, vesical and rectal disturbances, and the habit of the patient to lie upon the side of the lesion. That in many cases the diagnosis has been attended with difficulties is proved by the statistics of von Brun, who found that in only 19 out of 39 cases the diagnosis was established during life. The difficulty in establishing the diagnosis and the confusion arises in many instances from the superaddition of symptoms due to associated lesions, such as fracture of the skull, concussion of the brain, and injuries to other parts of the body. Enderlen,[1] in his contribution to this subject, confines his attention chiefly to the atypical or irregular type of cases, and whenever possible offers explanation for the variations from the typical clinical picture.

1. As to the interval of consciousness, there are many cases in which this is absent. This may be due to the fact that the effects of concussion have not worn off before the effects of compression are beginning to make themselves felt.

2. Variations from the slow, full pulse have frequently been noted. According to Kocher, various factors may be responsible for this phenomenon, as, for example, the febrile reaction and the effects of concussion. It is well known that there may be considerable local compression without any evidences of increased intracranial tension, such as could alone account for the variations in the pulse.

3. There is no uniformity in the ocular phenomena. Wiesman's statistics show that of 70 cases, in 39 both pupils were dilated, in 7 they were markedly contracted, and in 20 there was unilateral dilatation on the affected side. According to von Bergmann, the most significant symptom is choked disk, but the choked disk may only be transitory. The disappearance of the choked disk does not imply, according to Kocher, the subsidence of cerebral pressure. It may be due to the fact that the pressure may have been relieved by the expression of cerebrospinal fluid from the cranial cavity and the relief from pressure thus afforded the cavernous sinus.

4. As there are variations in pulse, so there may be variations as to the respiratory phenomena. There are many instances in which the respirations are rapid and not stertorous, particularly in cases in which there are other cerebral injuries.

5. Aphasia would only be observed in those cases in which the hemorrhage involved the speech centre, and even then it might be masked by the unconscious state of the patient.

6. There is a wider variation in the motor disturbances than in any other single symptom. In the typical clinical picture one would expect to find a period of convulsions, due to cortical irritation, followed by hemiplegia, partial or complete. As exceptions to this, however, should be

[1] Deutsche Zeitschrift f. Chir., Band lxxxv, Festschrift, p. 165.

mentioned the half involuntary movements which may be regarded as a sign of irritation, and, as in one case, were the only signs of hemorrhage other than unconsciousness.

More confusing still is the presence of a collateral hemiplegia. One can readily understand how misleading this symptom would be, and how it would lead the surgeon to open the skull on the wrong side. Although the explanation of this is a matter which concerns the neurologist more than the surgeon, Enderlen reviews at great length the various theories that have been expounded to account for it. Suffice it here to mention briefly the more important ones. Thus, Oppenheim suggests a possible lesion of pons or cord or some anomaly to the decussating fibers. In many instances it is believed to be due to an erroneous interpretation of symptoms. If the patient is comatose the limbs are motionless and relaxed on the affected side (collateral). This is thought to be a hemiplegia and contrasted with the movements of the limbs on the opposite side (contralateral), which are due, in fact, to cortical irritation.

The opportunity for postmortem examination of the brains of patients who have died as a result of cerebral traumatism is very limited in some communities. In this, as in probably other communities, permission to make autopsies depends upon the whim of a disinterested coroner. For this reason we are deprived of the privilege of accumulating data which would be of immense value in our studies of the pathology and treatment of these lesions. We must, therefore, resort to experimental research in order to solve these problems. In this connection the experiments of Yoshikawa[1] may be appropriately alluded to. The investigation was undertaken for the purpose of ascertaining among other things whether cerebral hemorrhage was more profuse in those cases in which there is an associated fracture of the skull, whether contusion of the brain is usually associated with hemorrhage, and whether, in addition to hemorrhage, small aneurysms form which may account for the so-called spät-apoplexies. The conclusions to which Yoshikawa arrived in answer to these questions may be summed up as follows: Hemorrhage occurs frequently without contusion; traumatic aneurysms were not observed in any of the experiments; there was no difference in degree in the hemorrhage with and without fracture of the skull. The evidences of hemorrhage were widespread; signs of hemorrhage were found between the frontal lobe and olfactory bulb, in the lateral ventricles and adjacent tissue, even as far as the lumbar segment of the spinal cord.

Intracranial Hemorrhage in the Newborn. A year ago[2] a discussion of the treatment of intracranial hemorrhages in the newborn was suggested by Carmichael's paper. Since that time Seitz[3] has contributed two interesting papers upon the same topic, one based upon a study of

[1] Monatsheft f. Psychiatrie u. Neurologie, Band xx, Ergangausheft, S. 251.

[2] Progressive Medicine, March, 1908.

[3] Archiv f. Gynäkologie, Band lxxxii, p. 527.

his observations of some 19 cases, in which he suggests the propriety of resorting to surgical measures, the other[1] recording his experiences with a case in which he had an opportunity to carry out the suggestion. As a result of his earlier clinicopathological studies he drew two very practical conclusions: (1) That large intracranial hemorrhages are followed by a train of symptoms sufficiently definite to establish not only a diagnosis of brain pressure, but to enable one to recognize the seat of the hemorrhage, *i. e.*, whether it is above or below the tentorium, on the right or left side of the brain; (2) that hemorrhages over the cerebral hemispheres, *i. e.*, solely above the tentorium, are only exceptionally unilateral. Children with this type of hemorrhage may live several days, but as the cerebral pressure increases they eventually die. For those cases in which the symptoms are indicative of a gradually increasing pressure he recommends the removal of the clot by surgical procedure.

In the case upon which he operated the symptoms pointed to right-sided hemorrhage. The symptoms included a left-sided lagophthalmos, right-sided mydriasis, head turned to the right, some rigidity of left arm, and increased reflexes. The serious respiratory disturbances suggested the presence of a hemorrhage beneath the tentorium. A flap corresponding to the right parietal bone was reflected, and upon incising the dura the blood spurted out of the opening as though it were under great tension. The clot was removed, the brain douched with hot saline solution, and the wound closed. The immediate effect of the relief of pressure was marked. The child, hitherto comatose, at once reacted, breathed more freely, began to cry, and was able to close the left eye. Within a short time the condition of the child grew worse and it died ten hours later. A frozen section of the brain showed the left hemisphere entirely free from blood and small clots over the anterior portion of the right hemisphere, but what was of greatest importance, the posterior fossa filled with a clot that extended down as far as the medulla. The latter, no doubt, explained the fatal issue. Despite the unfortunate and inevitable result in this case, Seitz strongly endorses the radical treatment and advises operation at as early a stage as possible, just so soon as it is evident that the pressure symptoms are getting worse rather than better.

Punctured Fractures of the Base of the Skull. While punctured fractures of the skull are, comparatively speaking, infrequent, they constitute a group with such marked peculiarities as to justify their consideration apart from similar injuries of the vortex. One of the surgeons to the Leeds General Infirmary, R. Lanford Knaggs,[2] has given a very practical presentation of this subject. He calls attention to those points on the base of the skull at which these accidents are more likely to occur; these include the thin orbital plates, the cribriform plate of the ethmoid,

[1] Zentralblatt f. Gynäkologie, 1907, Nr. 30.

[2] Lancet, June 1, 1907.

the anterior lacerated foramina, the floor of the middle fossa, the base of the temporal or zygomatic fossa, and, if approached through the nasal or nasopharyngeal cavities, the region of the sphenoidal sinus. These are the places where penetration can be and occasionally is produced by a comparatively slight amount of force. In the majority of cases the offending instruments reach the base through or across the orbit, either on the front from below upward, or from inside the zygomatic arch, and the position of the skin wound may be such as to fail to arouse suspicion. The less frequent approach is through the mouth, pharynx, or nose, and a not uncommon route passes inside the zygomatic arch.

If one reviews the series of punctured fractures of the base of the skull, the following distinctive features will be recognized: (1) The frequency with which the true nature of these cases is overlooked. In many cases the character of the lesion is not recognized until several days after the accident, when attention is called to the true nature of the condition by the development of a meningitis. Signs of an intracranial lesion will be recognized at an earlier stage if the accident gives rise to intracranial hemorrhage. As Knaggs points out, there must be some circumstances apart from professional carelessness or incompetency to explain this frequent non-recognition of penetrating fractures of the base. It may be due in part to the fact that appearances are often misleading; the superficial wound, which is usually trivial, may be at a considerable distance from the opening in the skull, and, furthermore, at the time the examination is made there may be no symptoms even suggestive of intracranial injury. The wound tract from the surface to the skull may be so circuitous as to make it impossible to follow it with a probe. Another contributory circumstance is the lightning-like rapidity with which the wound may be inflicted and the weapon withdrawn. This is particularly so in cases of wounds inflicted in fencing, and, finally, it often happens that the wounds are regarded as so trivial by the patient that they do not seek advice until the onset of serious symptoms.

Another peculiarity of punctured fractures of the base of the skull is the retention of the foreign body. It happens occasionally, either when the wound was inflicted or in attempting to remove the offending object, that a portion of the latter breaks off and is left behind and overlooked. There is a case on record in which the blade of a penknife had been embedded in the orbit and frontal sinus for forty-six years. The third peculiarity is the tendency to septic complications; if the patient escapes from the immediate effects of the injury, he develops almost invariably either a meningitis, encephalitis, or a cerebral abscess. This is easily accounted for by the character of the wounds and by the inaccessibility and non-recognition, at least in the early stages, of the focus of inflammation. The fourth salient feature of these fractures is their fatal character. The number of cases of recovery are very few; in fact, they could be counted almost on the fingers of one's hand.

Traumatic Psychoses. The effect of exploratory operations upon traumatic psychoses is in some cases very striking. This is true not only of those cases in which some demonstrable lesion is found, but also in those in which the findings have been negative. Many explanations have been offered to account for the improvement following operation, some of which attribute it to the influence of suggestion, others again to the possible alteration in the circulation of the affected region following the exposure during the operation. A recent experience of my own which I have not as yet reported may be referred to. It was the case of a young man who had been struck on the head with a baseball bat and had been unconscious for two weeks. Upon recovering consciousness he was found to be hemiplegic and to have some disturbance of sensation on the affected side and defective memory. The latter condition persisted for several months, at which time I recommended an exploratory craniotomy. Absolutely nothing was found at the operation to account for the symptoms, but the effects of the operation were most gratifying in that the patient within a week was able to move the affected arm as freely as the other, and recovered his memory for events happening since the accident occurred.

Hollander[1] calls our attention to perhaps a more striking example of the effects of operation upon traumatic psychoses, the patient being a physician, who as a result of a fall from a bicycle several years before had become emotional, depressed, suspicious, irritable, and had even developed suicidal ideas. He had complained of intense headache on the right side and burning sensation just posterior to the right parietal eminence, and a few months later had symptoms of word blindness and a transient attack of paralysis of the right side of the face and left half of the body. A portion of the skull was removed, for purposes of exploration, from the region corresponding to the posterior part of the temporal convolutions and the angular gyrus. At this point the bone was found thickened and hardened, with scarcely any diploë, and the dura mater adherent to it. When the bone was removed there were no evidences of pulsation. The dura was thick, opaque, and when opened a stream of clear fluid spurted out. The cortex of the brain appeared normal. The dural wound was closed, but the bone was not replaced. However, by this very simple operative procedure the patient entirely recovered and resumed his interest in affairs.

Trifacial Neuralgia. The medical profession has exhibited much interest in the so-called injection method of Schlosser. The doctor and the patient naturally prefer some method of treatment which does not require the use of the knife. For this reason especially this plan of treatment has attracted much attention and appeals to the profession. The principles of injecting a chemical which will cause degeneration of the nerve

[1] Lancet, March 9, 1907.

tissue is not a new one. It is only a few years ago that a great to-do was made about the osmic acid injections, and today one hears very little about them. But the osmic acid method was applicable only to peripheral lesions and involved the exposure of the nerve through an open wound. The alcohol injections of Schlosser are made directly through the skin, not only into the peripheral branches, as the supra- and infra-orbital, but into the divisions of the ganglion and the ganglion. Thus the Schlosser method has been offered as a substitute not only for the peripheral operation, but the central operation, and some would have us believe that the treatment of trifacial neuralgia has passed from the hands of the surgeon into the hands of any practitioner of medicine.

There are two phases of this treatment that must be definitely understood before we can pass judgment upon it: one the safety or risk to the patient, the other the percentage of recurrences. The risk of injuring an important vessel in introducing a needle blindly from two and one-half to three inches from the surface is not imaginary. In fact, only a day or two ago it was reported to me that in the hands of one who considers himself quite proficient there developed shortly after the injection evidences of a large extravasation of blood. In another case it is reported that the patient was shocked by the first injection. Sufficient time has not elapsed to enable us to determine what percentage of recurrence will follow the injection. Upon this test chiefly the method must either stand or fall. From the surgeon's point of view the procedure is not attractive; it reminds him of the old-fashioned exploratory punctures, when the needle was driven blindly into the abdominal cavity for exploratory puncture, when subcutaneous operations were chosen because the surgeon feared the consequences of possible infection. It is distasteful to the surgeon to work blindly in the dark, and the whole trend of modern surgery is to make clean dissections and adequate exposures. It may be possible for us to become expert enough to be able to introduce the needle with such accuracy as to avoid important structures and be sure that the injection material is introduced directly into the ganglion itself or the second or third divisions, as the case may be. My own feeling is that the treatment will not replace the established operative procedures. However, it is now on probation, and a year from now we may be able to speak more positively as to its merits or demerits.

Fischler,[1] writing from the clinic of Erb, speaks enthusiastically about their experience with Schlosser's injection treatment not only of trifacial neuralgia, but of sciatica and neuritis as well. With the trifacial nerve the experience has been limited to the supra-orbital and infra-orbital branches. Of these there were 6 cases, and the improvement was so great as to warrant them being regarded as cured. The edema appearing in the eyelid as a result of the injection disappeared in a few days.

[1] Münchener med. Woch., 1907, Nr. 37.

Of 12 cases of *sciatica*, 4 recovered entirely, 4 partially, and 4 were unaffected. In some of the failures the result was attributed to some error in technique. This method of treatment is not without its dangers, however. This is particularly true of the mixed or pure motor nerves. Thus, Fischler refers to several cases in which motor as well as sensory disturbances followed the injection, and in one case paralysis of the area of distribution of the affected nerve persisted. While the alcohol injection method seems to have a great future in the treatment of pure sensory lesions, its application to pure motor or mixed nerves must be made with the greatest caution and only as a last resort.

In Blair's[1] case there was a good deal of shock after the first injection; the patient complained of a tingling sensation over the root of the nerve, but the neuralgia was better. After the third attempt at injection, when the Gasserian ganglion was reached, there was absolute cessation of pain and complete anesthesia. No mention is made of the period of relief after the injection.

PERIPHERAL OPERATIONS. As a means of preventing regeneration of the nerve, C. J. Mayo[2] plugs the foramen with a silver screw. In some cases the canal was plugged with lead, although soft silver or amalgam could be used. In all cases Mayo removes the gustatory, as he believes it is a possible source of irritation upon the branch causing the pain. In the intracranial operation the use of a thin lead or silver plate is suggested as a substitute for Abbe's rubber tissue. The plate could be made with a projection to drop into the foramen ovale, to prevent it slipping, and should be of such size and shape to extend over the foramen rotundum. It may be interesting in this connection to allude to the result of an operation I performed about a year ago. The inferior dental nerve was exposed and extracted by the Thiersch method and a screw introduced into the bony canal. Meantime the pain recurred, and at a second operation I found the bone around the screw had rarefied, so that the screw was quite loose and a newly formed nerve trunk circling the screw and traversing the trephine opening which had been made at the first operation.

For the so-called radical cure of trigeminal neuralgia by means of peripheral operations it is sufficient, according to Moschowitz,[3] to plug the foramen with some impermeable substance after the nerve has been removed. Instead of simple screws, as Mayo suggested, he uses small silver rivets with flat tops. His arguments in favor of the peripheral as against the central operation are based on the following conclusions: (1) We know nothing of the pathological anatomy of trigeminal neuralgia. (2) All proof is lacking that the neuralgia originates in the Gasserian ganglion. (3) All proof is lacking that the neuralgia is of central,

[1] Journal of the American Medical Association, April 20, 1907.
[2] Surgery, Gynecology, and Obstetrics, December, 1906.
[3] Medical Record, February 16, 1907.

(cerebral) origin. (4) Cures, so-called, for a longer or shorter period have been reported, even after minor peripheral operations. (5) Relapses, after a shorter or longer period, have been reported, even after such major operations as the extirpation of the Gasserian ganglion, even in the most competent hands. (6) In the present state of our knowledge we know of no positive cure; all our treatment must be symptomatic, and we can best attain this by interrupting the conduction of the sense of pain from the affected area. (7) All recurrences have been found to be due to a regeneration and reunion of the divided nerve tissues. Every one of these points is an absolute fact, so far as our present knowledge permits, and does not require theorizing or lengthy argument; it follows, therefore, that (8) the desideratum at present is to prevent regeneration and reunion of the divided nerves.

In a communication to the same journal Starr[1] takes exception to Moschowitz's attitude toward the central operation. The matter is such an important one, and the danger of the medical public being misled so great, that I venture to quote some abstracts from Starr's article. So much needless suffering to a very unfortunate class of patients may be caused by the acceptance of such statements as appears in the article by Moschowitz, that he (Starr) ventures to call attention to certain errors. Thus, Moschowitz says all proof is lacking that the neuralgia originated in the Gasserian ganglion. To which Starr replies: "There can be no better proof than the fact, of which I have personal experience in more than a dozen cases, that when operations upon the peripheral branches of the trigeminal nerve fail to relieve (as they always do fail to give permanent relief) an excision of the Gasserian ganglion or a division of the root of the fifth nerve between the ganglion and the pons always cures. I have never seen a relapse when the ganglion was completely and properly removed, and the published records of Hartley, who first did this operation in America, of Krause, who did it simultaneously in Germany, and of Keen, whose experience has been extraordinarily convincing in this line of work, amply confirms this conclusion. These statements refute absolutely the other assertions of Dr. Moschowitz, which therefore require no notice. I have seen so many patients who have been operated upon in vain by various kinds of peripheral operations, and recently by osmic acid injections into the nerve branches, and who have finally come to the radical operation after months of needless suffering, that I do not hesitate to recommend the operation for excision of the Gasserian ganglion, *provided I can select the surgeon to do it.* I have seen failures only in incompetent hands.

"Dr. Moschowitz claims that it is to the regeneration of the divided peripheral nerve that recurrence of pain is due. That may be true, but I have cases on my records where the pain has recurred when a half-

[1] Medical Record, February 23, 1907.

inch of the nerve has been exsected; and other cases in which pain has returned and at the radical operation no evidence of regeneration or union of the formerly divided peripheral branch has been found. Keen has similar records. The cases cited by Moschowitz are both too few in number and are reported far too soon to afford any convincing proof of his statements, but if his suggestions are followed patients will only temporarily be relieved, if at all."

Quoting Krause's statistics as an argument in favor of less radical procedures, Lissowsky[1] advocates the more frequent resort to Krönlein's operation. Krause has divided the second and third divisions at the base of the skull in 36 cases. Of these, 3 died, 1 of pneumonia and 2 as a result of hemorrhage. (This yields a mortality of over 8 per cent. as compared with the 5 per cent. mortality of operation upon the ganglion in the hands of experienced surgeons.) In Lissowsky's case the patient recovered from the operation, but with some limitation of movements of the jaw and paralysis of the muscles in the upper branch of the facial nerve. Altogether the result from the functional as well as cosmetic effect was entirely satisfactory.

CENTRAL OPERATION. There are a number of methods by which the ganglion may be approached, and each method has its stanch advocates—the direct temporal or intracranial route, the extracranial route, and the combined intra- and extracranial route. It is idle to indulge in a discussion as to the relative merits of these procedures; they are none of them new, they have all been well tried, and are still practised. One tires of reading the long and drawn-out presentations of the pros and cons in favor of one and against the other operation, to be sure written in some cases by men of experience, but in others again by those who have practically derived all their information from operations upon the cadaver. While it is all very well, nay, imperative, for one to practise operations on the central nervous system (especially those for lesions of the Gasserian ganglion, hypophysis, and posterior cranial fossa) on the cadaver before undertaking them on the living subject, the man who has not had a reasonably large experience in operations upon the living subject, in which the elements of time, shock, hemorrhage, and many others, including the patient's life, must be taken into consideration, is not qualified and should not presume to criticise the methods of those who speak from actual experience.

The best method of approaching the ganglion is not necessarily the method of Hartley, or Quenu, or Poirier; it is the method by which the individual surgeon finds he can remove the ganglion more effectively and expeditiously with the least risk to the patient's life. One may prefer to ligate the external carotid, one the middle meningeal, another neither. One may prefer to resect temporarily the zygoma, another to leave it

[1] Russ. med. Rundschau, 1907, Heft 2.

intact, another to remove it altogether; one chooses a high opening, another a low opening; one removes the base of the skull up to the foramen ovale; another only so far as the crista infratemporalis. Let each surgeon choose for himself the method which he believes in his hands will be the most effective. The operation in the hands of the uninitiated, the man who only does a few, perhaps five, perhaps ten, in the course of a lifetime, will always appear difficult. In the hands of those who by a richer experience are thoroughly familiar with the anatomical relations and the more common variations, with the possible complications and how to meet them, the operation is not the hazardous undertaking which the advocates of the so-called injection cures would have the medical public believe.

Braun,[1] a pupil of Krause, discusses the various methods of exposing the ganglion, more especially with reference to the dangers peculiar to this operation. His personal experience upon the living subject having been limited to three cases, most of his observations are based upon work carried out upon the cadaver. For an approach to the ganglion he prefers an opening somewhat lower and broader than that of Krause. His flap measures from 2.5 to 3 cm. in height and from 3.5 to 4 cm. broad at the base. The incision begins at the external angular process and terminates at the same level just in front of the ear. It is not necessary to remove the bone farther than the crista infratemporalis, and the ganglion is rendered more accessible if the middle meningeal artery is ligated. By this method Braun claims to have been able to expose the ganglion without using a spatula to elevate the brain. Resection of the zygoma as practised in the methods of Quenu and Lexer he considers superfluous, since the zygoma lies either in the same plane or a little below the plane of the base of the skull, and does not, therefore, in any way obstruct the view to the ganglion. The extensive resection of the base of the skull, the so-called zygomatic basal method, in which the bone is removed as far as the foramen ovale, is not only unnecessary, but adds to the danger by prolonging the operation and increasing the hemorrhage. He sees no especial advantages in the extracranial approach to the ganglion as practised by Doyen and Poirier, or the combined extra- and intracranial methods of Quenu and Lexer. In practising these methods on the cadaver he found it more difficult to recognize the important anatomical landmarks than is the case with the temporal route. The point at which the brain is most in danger of being injured is between the foramen ovale and the middle portion of the ganglion, therefore, the removal of the bone only so far as the foramen has no advantages, and may have certain disadvantages, in that it is not always an easy matter to remove the bone from the base, and this step of the operation may be attended by serious hemorrhage. By the temporal route there may be more

[1] Deutsche Zeit. f. Chir., Band lxxxvii, Heft 1–3.

troublesome hemorrhage, but none to be compared with that which may come with the basal route from injury to the pterygoid plexus. Krause lost one patient from hemorrhage of this origin, and Lexer reports several cases of very serious hemorrhage.

One of the possible serious complications of operations upon the Gasserian ganglion is an injury to the brain from the pressure of a retractor. The advocates of the basal route have regarded this as one of the most serious objections to the temporal route, but experience seems to prove that this argument is not well founded, for very rarely do we hear of such complications, and when they have occurred it has not always been proved that the injury was due to undue pressure exerted upon the brain with the brain spatula. Poppert abandoned the temporal operation because he lost a patient from circulatory disturbances of the brain on the same side as that of the operation, which he attributed to compression of the artery of the Sylvian fossa by the spatula. Braun is inclined to believe that this complication might just as well be accounted for by the general circulatory disturbances that are common in old people, citing a case in which death was shown to be due to cerebral embolism in the side opposite to that of the operation.

As a means of controlling hemorrhage Braun favors ligation either of the middle meningeal or external carotid arteries (the latter lessening venous bleeding); he places the patient in the vertical posture, and urges the greatest care in the administration of the anesthetic, since the slightest respiratory disturbance causes hyperemia and brain tension, and both are objectionable. Lumbar puncture to relieve tension and remedies to lower blood pressure should not be considered. The advantages of a two-stage operation when hemorrhage has been troublesome have been more than offset by the additional dangers of wound infection and a second etherization.

The results of Braun's operative experience in lesions of the middle fossa are not brilliant, assuming that the 3 cases published with the paper are representative ones. Case 1. An operation for the removal of the ganglion performed in two stages because of severe hemorrhage. Death on the fourth day. Cerebral embolism. Case 2. A simple case of hemorrhage from the middle meningeal artery treated by trephining and tamponade. Case 3. A gunshot wound of the middle cerebral fossa, in which an attempt to discover the bullet failed and the patient died.

At the last meeting of the French Congress of Surgery, Dollinger[1] presented the results obtained in his operations for trifacial neuralgia. They are particularly valuable, because most of the operations, all the central ones, had been performed from six to nine years before. There were 22 extirpations of the ganglion, two not having been completed on account of severe hemorrhage. But one patient died. If this

[1] Revue de Chirurgie, November, 1907.

is his only fatality, and the 22 cases represent his entire experience, Dollinger's mortality is only 4½ per cent., which is a very creditable showing and illustrates what may be accomplished by experienced hands.

Of the total series, 1 died eight days after the operation, 4 died a few years later of some intercurrent affection, and 2 were lost sight of. Of the remaining 15, all have paralysis of the masseter muscles and complete anesthesia on the affected side. Some noticed slight tickling sensations and some sensation of pressure, one was sensitive to draughts and another to cold. In one case there was a cutaneous eruption similar to acne. There was complete anesthesia of the cornea and conjunctiva in all but one of the cases. In other words, while there was a moderate return of sensibility in a few cases, in none was there any recurrence of pain. The comparison of this record with the record of his peripheral operations is instructive. Of 14 peripheral resections there were 11 recurrences from six to eighteen months after the operation, and 1 case was not even temporarily benefited.

In a general *resume* of his views as to the important features of the operation upon the ganglion, F. Martin[1] advocates division of the sensory root. "If the ganglion can be worked free from its bed it can be sectioned across behind the ganglion without undue hemorrhage. The sectioning across of the sensory root back of the ganglion is the *most essential step* in getting a complete subsidence of pain. When this is done successfully it cuts off completely all the sensory distributions conducted through the various branches of the fifth nerve, and it is a matter of no special moment whether the ganglion is left in or whether it is removed."

In all but one of the 8 cases which he has operated upon he seems to have chosen to go farther and remove the ganglion. Two of these 8 cases died, 1 of pneumonia on the fifth day and 1 of shock on the second day. In 2 cases hemorrhage was so profuse as to lead him to believe the cavernous sinus was torn.

Schachner's[2] case was devoid of special interest. Hemorrhage was so profuse that it could only be controlled by packing the wound with a long strip of gauze. The patient has remained free from recurrence for a period of two years.

Williams,[3] preliminary to an excision of the Gasserian ganglion, tore the middle meningeal artery as it emerged from the foramen spinosum. Hemorrhage was quickly and absolutely controlled by forcing into the opening a conical plug of wood previously prepared by repeated sterilization for this special purpose. This is not unlike the suggestion of Krause, who recommended the introduction into the foramen of the end of a blunt hook. It is a very simple matter to ligate the middle meningeal

[1] Annals of Surgery, May, 1907.
[2] Louisville Monthly Journal of Medicine and Surgery, January, 1907.
[3] Denver Medical Times, March, 1907.

artery at this point, a procedure that recommends itself to me more than the introduction of some foreign material.

The day after the Gasserian ganglion was excised, Porter[1] noticed a facial paralysis, which proved to be permanent. There was no traumatism inflicted that could have involved the trunk of the facial provided it took the usual course. Three explanations are offered to account for this complication: (1) It may have been a mere coincidence; (2) the course of the nerve may have been unusual; (3) the nerve may have been injured by traction on the chorda tympani.

Facial Paralysis. Girard's[2] experience has been limited to 4 cases of anastomosis of the facial with the spinal accessory nerve. In 2 cases the operation had been performed too recently (when reported) to allow of restoration of function; in the third case the return of muscular tone was quite evident, and in the fourth the results were most satisfactory. The patient could close the eye and elevate the angle of the mouth. The naso-labial fold was restored. In this list may be added 3 cases presented by Knapp.[3] In one, operated upon six months before by Lund, a facio-hypoglossal anastomosis, restoration of function had already been established in so far that the patient could almost close the eye and elevate the angle of the mouth; in another case, after a similar operation, the patient "had very good control of the face," and in the third the patient had not regained any motion three months after the operation. The paralysis had been of sixteen years' duration, the nerve was small and much degenerated.

In Currie's[4] case the paralysis of otitic origin was of three hundred days' duration, and the first sign of improvement was observed one hundred and seventy days after the operation—a facio-accessory anastomosis. When the last observation was made, about eighteen months after the operation, the symmetry and volitional movements were almost perfectly restored. There was still some deficiency of emotional action in the left facial muscles, wasting of the trapezius and sternocleidomastoid muscles, and some associated movements. Thus when the patient raised the shoulder forcibly there was considerable contraction of the left occipitofrontalis muscle.

A faciohypoglossal anastomosis reported by Beck[5] gave promise of good results; within four months power had been restored partially to the muscles supplied by the lower branch of the facial nerve.

Of 4 cases of spinofacial, end-to-end anastomosis by Girard,[6] 3 were reported as improved. The formation of adhesion and cicatrices about the seat of anastomosis prevents the regeneration of nerve tissue. To avoid

[1] Journal of the American Medical Association, May 4, 1907.
[2] Revue Médical de la Suisse Romande, vol. xxvi.
[3] Boston Medical and Surgical Journal, vol. clv, No. 22.
[4] South African Medical Record, 1907.
[5] Laryngoscope, January, 1907.
[6] Revue de Chirurgie, November, 1907.

this Girard recommends the protection of the seat of anastomosis with a flap of muscular or adipose tissuse, a tube of decalcified bone or formalin gelatin, or an artery. Once he used a flap of gold-beater's tissue held in place with several catgut sutures.

In Vidal's[1] cases one spinofacial anastomosis failed and one hypoglossofacial anastomosis was successful. In one case he sutured the recurrent laryngeal nerve, which had been injured during a thyroidectomy, with complete restoration of function to seven months. Peugniez[2] reports one complete cure and one improvement after spinofacial anastomosis, one satisfactory result after hypoglossofacial anastomosis, and another after anastomosis of the circumflex with radial nerve for deltoid paralysis. Faure's[3] five cases were all improved.

Osseous Tumors of the Skull. In pre-antiseptic days surgeons rather dreaded the operative treatment of osteomata of the skull. Since Bornhaupt reported his successful removal of an osteoma of the frontal sinus, a number of similar reports have appeared in literature. Von Eiselsberg[4] records in some detail two cases of this description. The first, a woman, thirty-five years of age, had complained of severe headache for eight years, and during this period developed epileptic seizures, and later complained of pain in the back, arm, tongue, and posterior fossa. The tumor, about the size of a man's fist, was removed, and with it a portion of the ethmoid bone. Six weeks later the defect in the skull left by the removal of the tumor was covered with a celluloid plate. The wound healed kindly and the patient was discharged from the hospital, only to develop a coryza, which was followed in turn by a meningitis and the patient's death. The tumor, which had evidently taken its origin from the periosteum of the frontal sinus, differed somewhat from those hitherto observed in that the superficial portion was composed of soft cystic bone and the central portion of eburnated bone. In the majority of cases these conditions are reversed. It is not so surprising that this patient should have developed meningitis, since the same complication has arisen in cases in which the ethmoid has not been removed, the inflammatory process having first involved the bone and secondarily the meninges. It is more than likely, in view of the grave symptoms, that any further treatment would have been unsuccessful, although Kümmel has gone so far as to recommend in such cases the removal of the celluloid plate, irrigation of the affected region, and lumbar puncture. Von Eiselsberg rather looks askance at this suggestion. In the future he would keep his patient in the hospital a longer time, in order to prevent, if possible any indiscretion which would be likely to provoke a coryza and lead to meningitis.

The second case was one of multiple exostosis of the skull; the largest

[1] Revue de Chirurgie, November, 1907. [2] Loc. cit. [3] Loc. cit.
[4] Archiv f. klin. Chir., Band lxxxi, Th. 1.

of these originated in the frontal bone, and had given rise to certain pressure symptoms, including choked disk, exophthalmos, and lagophthalmos. The patient had no headaches and no involvement of the cranial nerves, save those supplying the contents of the orbit. The exostoses were removed at several sittings, and nine months later a fibrosarcoma from the base of the skull posterior to the bulbus. The patient recovered from the last operation, but there was a recurrence of the growth and a return of pressure symptoms. The osteoma in this case was of the cancellous variety, and the situation and appearance resembled somewhat a unilateral localized leontiasis ossea. The recurrence of choked disk after the removal of the osteoma was evidently due to the development of the fibrosarcoma; while the latter growth may have been a pure coincidence, it is not improbable that this took its origin from the base of the osteoma. A considerable defect in the skull remained after resection of the growth, and on one occasion symptoms of cerebral compression developed as a result of a too tightly applied bandage.

Operation for the removal of osteomata of the skull are attended with certain dangers and difficulties. The principal danger and one difficult to avoid is the infection of the meninges. It is this that should make one hesitate to recommend operation in these comparatively harmless tumors, unless, as in von Eiselsberg's case, it be necessary for the relief of pressure symptoms, such as headache, disturbance of vision, and epilepsy.

Leontiasis Ossea. We are indebted to Kanavel[1] for a comprehensive article upon this subject, particularly with relation to the indications for curative or palliative operations. For the purpose of studying the disease in its various phases he has collected from the literature some 50 cases, 34 of which have been classified as typical, and the remaining 16 as atypical. In the classification the greatest difficulty arises in determining the relationship of leontiasis ossea to von Recklinghausen's disease on the one hand and sarcoma on the other. From a review of the etiology and pathology of these affections he concludes that the relationship between leontiasis ossea and the other trophic changes in bones cannot be settled at the present time. This disease, therefore, cannot as yet be classified as a pathological entity, although its clinical individuality should be retained. As to the findings in the 34 so-called typical cases, the following statistics are recorded: In 10 the nasal fossa was closed and the antrum of Highmore partially or completely obliterated; in 11 cases there were neuralgia pains, in 4 hearing was impaired; there were 7 cases of involvement of the tear duct, 4 of epiphora, and 3 of dacryocystitis. In 15 cases the orbital cavities were so encroached upon as to produce proptosis, and in 10 of these there was a varying degree of optic neuritis; symptoms possibly due to cerebral compression were noted in 15. Some had convulsions, others mental impairment, headache,

[1] Surgery, Gynecology, and Obstetrics, vol. iv, No. 6.

dizziness. The development of the disease was always slow and may apparently become arrested at any stage; the longest period of time intervening between the onset of the disease and the death of the patient was forty years. Until more authoritative statements can be made as to the etiology, no operative treatment can be undertaken with the hope of cure.

The question of the relation of the disease to the pituitary body is still undetermined. Perhaps of greater practical consideration is the applicability of the decompressive operation. Kanavel believes that the palliative operation is worthy of a more careful consideration by surgeons than has hitherto been given to it. In the series of 15 cases in which the symptoms were attributed to cerebral compression, the first was a patient of Horsley's, who suffered from headache, vomiting, and epileptic fits. In this case a decompressive operation could undoubtedly have been done with the hope of relief, although it was not undertaken. There is justification for assuming in the remainder that palliative operations might have relieved the patients for years; at least in one-half the cases operation was not only feasible, but imperatively demanded, and might have preserved the cerebral functions for years. As to the relation of the bony changes to optic neuritis, a study of the cases seems to show that it may be either the result of cerebral compression or changes in the orbital cavity. Inasmuch as either condition may produce the lesion, operative interference should include the orbital cavity.

In many cases (17 out of 34) the structural changes involve the contents of the orbit. The symptoms caused by encroachment upon the orbital cavity may be relieved by removing a considerable portion from the outer part and roof of the orbit. The bone may be removed as far as the optic foramen, releasing the optic nerve and artery if they be compressed. There is no reason why such intervention should not be extended also to relieve the obstruction and obliteration of the nasal fossa. Kanavel chiselled out the bony deposits on both sides, affording a free ingress of air. A number of the other recorded cases might have been relieved in like manner. The permanence of the relief, of course, depends upon the rapidity of the growth. In many instances, no doubt, a second operation would be required. Other operations may be carried out for the purpose of relieving neuralgia, of preventing the growth, or for cosmetic purposes. The paper includes a *resume* of the clinical histories of the 34 typical cases, together with a brief description of 23 skulls.

The Face. CAVERNOUS ANGIOMA. Cranwell[1] reports an example of this type of tumor in a man, aged twenty-two years, which had gradually grown during a period of twenty years to an enormous size. It began as a small nodule, and never caused pain. When examined, a large lobulated tumor was found, solid in consistency, covered by

[1] Revue de Chir., April, 1907.

mobile, normal skin, and containing several hard nodules. The absence of involvement of the superficial vessels made the diagnosis difficult, especially from a lipoma.

The inferior maxilla was bent inward by the pressure of the tumor, which extended from the temporal region nearly to the shoulder. The removal was very difficult, owing to extensive bleeding and to the fact that the mass, by pressing the jaws inward, extended deeply to the base of the skull. The coronoid process was atrophied and the pterygoid apophysis absent. The hard nodules observed before operation were found to be large angioliths. The patient recovered, and except for the deformity of the maxillary bones was in excellent condition two months later.

MIXED TUMOR OF THE FACE. The mixed tumors in the region of the parotid gland are variously believed to be epithelial, endothelial, or connective tissue in origin, with either metaplasia of connective into cartilaginous tissue or the inclusion of some of the cartilage from the branchial arches. Gayet[1] believes that many arise from the branchial clefts, and cites an example of a small, uniform tumor removed from the fold at the side of the nose. The tumor was hard, did not fluctuate, was not encapsulated, and upon section showed a homogeneous tissue resembling a vascular fibroma. Histologically it proved to have a structure like those of the commonly described growths occurring in the parotid and submaxillary regions. Gayet believes this case and certain others from the literature offer an argument for the branchiogenic origin of cervicofacial mixed tumors.

MIKULICZ'S DISEASE. Gutman[2] discusses the etiology of symmetrical swelling of the lacrymal and salivary glands (Mikulicz's disease) from a new standpoint. This disease has been considered to be associated with lymphomatosis and pseudoleukemia, and to present, in some cases, the lesions of a chronic interstitial process resembling tuberculosis, but in the case reported, a man, aged twenty-seven years, there was a history of syphilis contracted three years before. From cases in the literature and the well-known theory that syphilis rarely if ever attacks the salivary glands, Gutman believes that syphilis can act as an important etiological factor in Mikulicz's disease, and that this suggests, as in the case reported, the use of mercury in treatment.

SIALOLITHIASIS. Hall[3] reports a case of salivary calculus in Wharton's duct. The patient was a man, aged twenty-two years, the condition having existed for five years with slight swelling at angle of jaw and some tenderness. Suppuration ensued, and the calculus was removed through an insertion in the floor of the mouth about one inch from the mouth of the duct.

[1] Revue de Chir., August, 1907.
[2] Berlin. klin. Woch., September 9, 1907, p. 1141.
[3] Journal of the American Medical Association, 1907, vol. xlix, p. 1363.

SKIAGRAPHY IN SURGERY OF THE NOSE. Goldmann and Killian[1] are enthusiastic as to the value of this method of diagnosis as based upon thirty observations upon the sinuses, in which an operation confirmed in every respect the skiagraphic findings. The anteroposterior method is preferred, the patient lying with his forehead upon the photographic plate and the rays passing through the cranium. They were able to detect the absence of the frontal sinus, and the presence of purulent collections and tumors. A deep shadow must be obtained to make a positive diagnosis, as a swollen, edematous mucous membrane may also throw a shadow.

Harland and Pancoast[2] discuss the value to the rhinologist of skiagraphs in giving a definite idea of the shape, size, and location of the accessory sinuses and in indicating the presence or absence of serious pathological changes. Thus one can determine if a probe really enters the frontal sinus, the depth and extent of the same, and the position of its septa. Gross neoplasms, foreign bodies, and pus in one of the frontal cells can plainly be seen.

The *x*-rays must, however, be used in conjunction with other methods of diagnosis, as it is open to some of the sources of error that detract from the value of transillumination, for pictures will be influenced by such factors as thickness of bone and the fact that the cells and sinuses overlie one another in the picture.

RHINOPLASTY. Finney[3] reports two cases operated upon for reconstruction of noses in which the fingers were utilized for the new nose. The ring finger of the left hand is selected, the nail and matrix are completely removed, and the dorsum of the finger up to the distal end of the first phalanx denuded of skin; the tip of the finger is also denuded of skin. The skin covering the nose is freed from its underlying attachments, stretched carefully and thoroughly, and the soft parts freed from the nasal process of the frontal bone; this is all done within the nose. The edges of the nasal skin are freshened and the finger inserted into the nasal opening and held in place by suture. The hand is held in this position by adhesive straps and plaster-of-Paris bandages for two weeks, after which time the finger is disarticulated at the metacarpal phalangeal joint and left for another week. The finger is then flexed to a right angle and the new nose completed, and smaller operations performed to improve the cosmetic effect.

Leischner[4] writes a very elaborate and well-illustrated article from v. Eiselberg's clinic discussing the results in twenty-nine operations for defects of the nose. Most of these were done by the usual methods, in which the flaps are removed from the forehead, arm, or chest, and in

[1] Beit. z. klin. Chir., 1907, Band liv, Heft 1.
[2] Penna. Med. Jour., 1907, vol. x, p. 525.
[3] Surgery, Gynecology, and Obstetrics, 1907, vol. v, p. 23.
[4] Arch. f. klin. Chir., 1907, Band lxxxiv, S. 29.

the majority an excellent cosmetic result was obtained. In two cases the cartilaginous portion of the ear was directly transplanted to replace the defects of the alæ. In another, where the greater part of the nose had been destroyed by lupus, the little finger was used to replace the septum, in much the same manner described above by Finney. The result obtained after several smaller plastic operations and paraffin prosthesis was excellent.

Tumors of the Jaws. Eve[1] discusses the pathology and treatment of the various types of neoplasms arising from the maxillæ. In regard to epulis, he insists upon the separation of the giant cell type of this tumor from the myeloid or central sarcoma, which also contains giant cells. The latter springs from the cancellous tissue, and has a homogeneous or faintly fibrillated intercellular substance, while the epulis arises from the alveolar periosteum or the periodontal membrane, and shows a distinctly fibrillar matrix. The giant cell central sarcoma is distinctly benign while the epulis is very prone to recur (18.2 per cent.) unless thoroughly removed.

In addition to epulis, sarcoma, carcinoma, and malignant embryonic dental tumors are the most common neoplasms met with. In describing the sarcomatous mixed odontome, which Eve states has never been fully described before, he believes that the epithelial element, consisting of branching strands of enamelogenous epithelium is derived from the enamel organ and the sarcomatous stroma from the tooth papillæ. The carcinomatous odontomes, consisting of tortuous, branched, or anastomosing masses or columns of epithelium, are derived from "rests" of the columnar cells of the enamel organ, and Eve states "that some of the carcinomatous tumors of the antrum arise from 'rests' of the germinal epithelium of the teeth, which make their way in the direction of the least resistance, namely, into the antral cavity."

Eve avoids the dangers attendant upon ether anesthesia and the hemorrhage from operation by a preliminary ligation of the common carotid artery and by laryngotomy. The incision in the neck enables the surgeon not only to ligate the artery, but also to ascertain the condition of the nodes behind the angle of the jaw and around the upper part of the internal jugular vein, because metastases to these structures is much more common in both carcinoma and sarcoma than is usually supposed.

Preliminary laryngotomy should be performed after the carotid has been ligated, and diminishes both the chance of inhalation pneumonia and of shock. Eve prefers Fergusson's median incision for excision of the upper jaw, and divides the malar bone and hard palate by means of a Gigli saw. When the position of the growth admits of the orbital floor being preserved, he does not sever the malar bone at the level of

[1] British Medical Journal, June 29, 1907, p. 1525.

the sphenomaxillary fissure, but divides the lower two-thirds of the malar with chisel or saw and the anterior wall of the maxilla horizontally inward parallel with the orbital margin until the cavity of the nose is reached. If a carcinomatous growth has commenced in the hard palate and does not appear to have extensively involved the antrum, only the lower half of the maxilla may require removal, but first the condition of the antrum must be ascertained by an exploratory opening. If in cases of disease of the maxilla requiring its removal the mucoperiosteum of the hard palate is not involved, Eve preserves it by carrying the incision along the inner surface of the teeth on the affected side and reflecting the mucoperiosteum. After removing the maxilla the edge of the flap of mucoperiosteum is sutured to the cut edge of the mucous membrane of the cheek. The roof of the mouth is thus restored.

Fairbank[1] has collected 140 sarcomata of the jaws from various sources, all of which were accompanied by a microscopic examination of the removed tissue; 40 per cent. were "myeloid" or giant-cell sarcomata, the least malignant of the various types. Another 40 per cent. were equally distributed among the round, spindle, mixed-cell, and fibro-sarcomatous types. The remainder, 20 per cent., were various miscellaneous types, such as endotheliomata, odontomata, chondrosarcomata, etc. The two jaws were equally affected. Glandular infection is rare, particularly when the upper jaw is the seat of the disease. If operation is undertaken the benign and malignant forms must be sharply differentiated, because myeloid growths require thorough removal of the tumor and neighboring bone only, while malignant types call for wide removal and formal excisions. The prognosis in jaw tumors, with the exception of the myeloid forms, is far from good.

V. Bergmann[2] reports an interesting tumor the size of a fist in the upper jaw of a one-day old infant. Seven days after operation the infant died. Microscopic examination revealed the presence of skin containing hair follicles, sweat and sebaceous glands, a cystic cavity lined with ciliated epithelium, and neuroglear tissue. It was considered to be either a bigerminal parasite or an isolated germ of ectoderm.

Broca[3] reports an instance of *actinomycosis* of the right superior maxilla of an infant, simulating sarcoma. The child was cachectic in appearance, but at operation the presence of an osteitis and numerous fistulæ led to free incision and drainage. Histological examination diagnosticated the lesion as actinomycosis, and by the use of solutions of iodine and large doses of potassium iodide internally a cure was gradually obtained.

Prosthesis after Resection of the Inferior Maxilla. Pichler and Ranzi[4] report four cases of resection of one-half of the inferior maxilla and

[1] British Medical Journal, November 23, 1907, p. 1506.
[2] Archiv f. klin. Chir., 1907, Band lxxxii, p. 863.
[3] Revue de Chir., March, 1907.
[4] Archiv f. klin. Chir., 1907, Band lxxxiv, S. 198.

one resection of the maxillary arch for carcinoma, sarcoma, and phosphorus necrosis involving the jaw. After removal of the diseased bone the defect was immediately filled by an artificial jaw made from tin moulded over a jaw bone. This splint is fastened to either side by means of wire or screws so placed as to permit of easy removal and examination of the wound; if a unilateral resection has been performed the splint is only fastened at one end, the other being mortised into the joint socket. Such a splint can be removed later and replaced by one made of gutta-percha mounted with teeth and placed by a dentist like a dental plate. Illustrations of the patients operated upon show excellent cosmetic results.

Cancer of the Lip. A splendid statistical study based on 241 cases, covering a period of fifty years, has been published by Rowntree.[1] Males were affected in 233 of the cases, making the ratio to the female sex 29 to 1. Cancer of the lip represented 2.72 per cent. of all cancer cases, constitutionally 1 case in 15 in males (6.8 per cent.) and 1 in 714 in females (0.14 per cent.).

Etiology. Males. The average age of the patients was 56.4 years, ranging from twenty-nine to eighty-one, and was computed from the time when the growth was first noted. Heredity and occupation seemed to have no influence. The influence of smoking could not be definitely determined, as only 60 of the case histories bear on this point, and show 9 non-smokers and 51 smokers, in 6 of whom the growth was not on the side where it was customary to hold the pipe. In 20 cases the growth developed at the site of precancerous lesions existing for some time, *i. e.*, "sore places," pimples, warts, ichthyosis, cracked lips, and a barber's cut which never healed.

Clinical History. The average duration when admitted was twenty-one months (six weeks to fifteen years), but 42 per cent. presented themselves before the expiration of six months. In 46 per cent. the lymph nodes were noted as enlarged, and in 10 patients the said involvement appeared on an average of 6.7 months after the growth on the lip. In 30 cases it was possible to determine the duration of life from the appearance of the cancer; in 10, classed as inoperable, this was found to be 24.5 months, and in 20 operated cases it was 43.5 months, proving that operation would prolong life on an average of nineteen months. Furthermore, 16 of these cases had an operation performed on the lip only, and with more modern treatment the results would be much better.

Pathological Anatomy. The lower lip was affected thirty-four times, more frequently than the upper, the right and left sides were affected equally, and in frequency the growth was about six times more common at the side than in the centre of the lip. In 68 per cent. the growth arose from the mucocutaneous junction, in 24 per cent. from the red line, and

[1] Archives of the Middlesex Hospital, 1906, vol. vii, p. 119.

in 6 per cent. from the buccal mucous membrane of 49 cases where the fact was noted.

It was difficult to figure upon the extent of recurrence after operation, because, of 126 patients operated in the Middlesex Hospital for the first time, 23, or 18 per cent., returned for a re-operation; but as there were also admitted 71 patients operated upon elsewhere, of whom 43 were classed as inoperable and 28 were operated upon again, it was only fair to infer that many of the Middlesex Hospital patients had also gone elsewhere to have recurrent growths removed. The date of recurrence when in the lip averaged twenty-four months, and when in the glands averaged seventeen months after removal of the primary growth, although in only 17 cases was the complete removal attempted, the surgeons usually being satisfied with the removal of a wedge of tissue from the lip. In 1 case the recurrence in the lip took place after a lapse of sixteen years, while in another only the submaxillary glands showed signs of involvement after eleven years. It is interesting to read that frequently the recurrence would take place at some little distance from the scar, varying from one-fourth to one-half inch, and 6 cases are cited where several growths suggested multiple points of origin, but were probably due to subcutaneous invasions from a central point.

Rowntree notes that the general tendency of a growth of the lower lip is to first extend outward along the margin to the angle of the mouth of the corresponding side, subsequently to extend to the cheek, and finally to extend downward toward the chin and submaxillary regions. In the later stages the growth also extends inward, fixes the tissues of the lip to the jaw, and ultimately leads to involvement of the floor of the mouth.

Females. The 8 patients averaged fifty years in age, the upper lip was affected twice, and in one case there was a history of smoking and in another of a wart existing for twenty years.

Last year[1] I referred to Cheatle's communication,[2] with special emphasis upon the inadequacy of the normal wedge-shaped excision of a portion of the lip, the seat of carcinoma. The same author has since added two additional papers,[3] which, together with the first, lay down definite laws for the spread of lip cancer. He shows that the spread of a cancer originating in the lower lip is centrifugal in direction, spreading often with greatest rapidity underneath the mucous membrane and involving the musculature early, especially the buccinator, orbicularis oris, depressor menti, and the depressor anguli oris muscles. This early invasion is due to the fact that the striated muscle fibers at their cutaneous insertions almost touch the squamous epithelium of the cutis vera, and bundles of fibers can be easily demonstrated among the sebaceous and sweat glands and hair follicles. The position at

[1] PROGRESSIVE MEDICINE, March, 1907, p. 83.
[2] Practitioner, July, 1906.
[3] Ibid., December, 1906, and August, 1907.

which the so-called recurrence of cancer of the lip appears is beneath the skin somewhere between the chin and the lip, generally nearer the lip than the chin, showing that the converging lines of a V-shaped incison either cut across the cancer or leave some of it behind.

When cancer of the lower lip is allowed to follow its natural course of extension it eventually occupies the circumference of the mouth, encroaching on the chin, cheeks, and nasal region at its periphery. Cheatle believes that cancer when it begins at the angle of the mouth behaves in practically the same way by spreading along the upper and lower lips and into the cheek. In removing such growths at the angle of the mouth the malignant ulcer should be cauterized until all bleeding has ceased and it becomes of a leathery consistence; the incision must begin midway between the growth and the centre of the lip, extend downward through all the soft parts to the lower margin of the inferior maxilla, and be continued along the jaw to the anterior edge of the masseter muscle. The incision in the upper lip also begins midway between the growth and the centre of the lip, and is carried upward through all structures as far as the ala of the nose, curves around this, and is continued by a curved incision, with the convexity upward, nearly to the edge of the masseter. The two incisions are joined by a curved incision with the convexity backward. The incisions are so planned as to include the orbicularis oris, risorius, buccinator, zygomatici, depressor anguli oris, and the platysma. The lymph nodes, submaxillary, submental, and those in the anterior triangle, are next removed *en bloc* by a continuance of the vertical incision, downward to the hyoid bone and back to the anterior border of the sternomastoid. A plastic operation covers all defects.

The spread of cancer in the upper lip, or in the skin which covers the cartilaginous part of the nose, is next considered, and it is shown that there are three anatomical conditions which complicate the spread of cancer in this region, and which do not concern the case of cancer in the lower lip or angle of the mouth: (1) The cancer spreads early to the alveolar margin of the upper jaw, particularly when the diseases affect the central part of the lip, which is shorter than elsewhere. (2) The septal origin of the orbicularis oris makes an easy pathway, and so the columella is affected before the alæ nasi. (3) The presence of the facial groups of lymphatic glands.

The incisions are so planned as to include the muscles which are invaded by the cancer, the orbicularis oris and its septal attachment, the buccinator, the depressor alæ nasi, levator labii superioris alæque nasi, levator labii superioris, levator anguli oris, and the zygomaticus minor.

As advanced cancers are usually symmetrical in appearance, and are usually limited at a line corresponding to the inner edge of the levator labii superioris, Cheatle for *small* cancers makes vertical incisions on

either side, starting from the edge of the lip, at a point between the lateral incisor and canine teeth, to the ala of each side, and by curving around this to its upper edge and then back by a curve to the starting point. The base of the columella and the upper lip are also removed and the parts replaced by a plastic operation, during which the buccinator glands, if present, can be removed.

If the growth is in the centre of one side of the lip the vertical incisions are different, the inner extending vertically upward from the centre of the lip and thence around the ala, while the outer incision extends upward and outward from the angle of the mouth in the direction of the external canthus until on a level with the ala; a third incision connects these two. All incisions must be made down to the bone.

In cancers at or near the middle of the upper lip the supramaxillary (the bone in front of the masseter) and the submaxillary nodes of both sides must be removed. In cancers on one side of the upper lip only those on the affected side need be removed unless the others are enlarged.

Cheiloplasty. Ectropion or eversion of the lower lips following extensive burns of the lower part of the face and neck, especially the deeper layers, renders the usual cheiloplastic procedures uncertain or impossible. Jacobson[1] describes an operation for the above condition which was used on two patients with gratifying results. An incision is made oval in outline, corresponding to the mucocutaneous margin of the everted lip and extending through the skin down to the superficial muscles. Sufficient flap is dissected up to overcorrect the deformity, and the reflected flap held up by a "skewer" made of a non-flexible and sharpened silver probe passed through one cheek, then submucously through the entire reflected lips, and then through the other cheek. This "skewer" passes through the cheek about one-fourth inch above and one-fourth inch external to the angle of the mouth, and is held in place by threading on both ends a gauze pad followed by a perforated shot. The denuded surface is then covered by Thiersch skin grafts, best held in place by a few stitches of either catgut or vaseline smeared silk. Frequent dressings will best overcome contamination by the mouth secretions.

Mouth. CLEFT PALATE. Last year[2] I stated that of late years there has been a decided tendency to operate on cleft palate at an early age, although there is still considerable difference of opinion as to the proper time. This again holds true this year, as two articles have appeared which differ greatly in the time advocated for operation. Roberts[3] advocates early operation on the palate, and would, as a rule, reserve the repair of the lip until a later time. The details of Roberts' method have been considered by Dr. Kyle in the present volume.

[1] Journal of the American Medical Association, 1907, vol. xlviii, p. 795.
[2] PROGRESSIVE MEDICINE, March, 1907, p. 75.
[3] American Journal of the Medical Sciences, July, 1907.

Brown[1] takes an exactly opposite view, and maintains that operation should be delayed until it can be done with a reasonable assurance of safety, preferably about the eighteenth month. He argues that it is well known that infants are peculiarly susceptible to gastro-intestinal diseases, that those with harelip often have other deformities or have insufficient vitality, and so a surgical operation will so lower the resisting power of the infant as to more greatly favor its succumbing to disease. Furthermore, early violent injury will cause serious permanent disfigurement of the nose and face by interfering with the development of the teeth, the form of the maxillary bones, and other osseous portions of the face. In exact opposition to Roberts, he believes that mouth breathing is favored by early operation, because it is a physical impossibility to close the cleft by immediate pressure of any kind without bringing the opposite side of at least one nasal opening in absolute contact, and partial or complete stenosis of the nasal passages will result. Finally, the stenosed nasal opening, the mouth breathing, the high contracted palates, the contracted irregular dental arches, and the inability to do deliberate work upon the soft palate will subsequently interfere with the speech. Brown applies adhesive plaster strips to the harelip from birth, to hide the deformity, to lessen the difficulty in taking nourishment, to diminish the width of the oral opening, and by continuous tension so aid the muscles that in a natural manner they bring the sides of the palate fissure nearer together. The harelip is next closed either in two weeks or in three months, if the general condition requires to be improved. At eighteen months the palate is closed throughout unless the patient is weak, in which case only the hard palate is closed and the velum allowed to remain until a little later.

Cancer of the Tongue. I have already referred to a statistical study by Rowntree on cancer of the lip, and the same author has also published a very complete statistical study of the same disease in the tongue. He found that there were 502 cases of this disease admitted to the Middlesex Hospital from 1855 to 1904, representing 5.7 per cent. of the total admittances for carcinoma. Males were affected in 436 of the cases, females in 66, making the ratio to the female sex 6.6 to 1.

Etiology. The average age of the patients affected was computed from the time when the growth was first noted, and was found in men to average 53.9 years and in women 50.2 years. As in carcinoma of the lip, occupation seemed to have no influence upon the frequency of this disease, but there was one curious point noted in investigating the influence of heredity, because in males there were 23 cases where a cancerous history was present, and in these the average age at onset of the growth was 51.3 years, while in those who had no hereditary history of cancer the average age was found to be 54.1 years. This also

[1] Journal of the American Medical Association, 1907, vol. xlviii, p. 754.

held true in women, of whom 11 had a cancerous history and onset average of 41.7 years, while in those without the average was 52.3 years. The record showed that 150 patients were questioned as to whether they smoked or not, and of these 145 were smokers, mostly of clay pipes, but in 2 of the cases the cancer developed on the opposite side from which the pipe was usually held. There is no record of the fact whether the women smoked or not. As is already well known, the influence of chronic irritation was an important one, 24 patients stating that the cancer followed various precancerous conditions, such as ulcers, warts, etc., and in 67 of the patients there was present in the history the irritation caused by rough or decayed teeth, tooth plates, etc. In addition to these, ichthyosis was present in 51 patients, of whom 48 were males. In 50 per cent. of these the malignant growth was on the dorsum of the tongue, and when we consider that only in 9.6 per cent. of the total cases was the growth so situated, the influence of the ichthyosis as a precancerous condition is apparent. Rowntree lays considerable stress upon the relation of this local condition to syphilis, and states that in 18 of the 51 cases syphilis was present in the history, in 15 it was absent, and in 18 it was not stated whether it was present or absent. In addition it was stated that in 17 cases at some period or other the tongue itself had been the seat of a syphilitic lesion (excluding ichthyosis). A positive history of syphilis was obtained in 15.3 per cent. of the entire number, but when it was considered that in only 150 of the records was a statement of the presence or absence of this disease noted, it is apparent that syphilis was frequent, and that the idea long held by some authors, notably the French, that there is a relation between this disease and cancer of the tongue, is based upon positive fact.

Hartzel[1] reports a case of extensive leukoplakia of the tongue and follicular keratosis of the skin in a girl aged eleven years. Fifteen years later she again came under observation, suffering from carcinoma of the tongue. Montgomery[2] reports an interesting case in a woman, aged thirty-seven years, who contracted syphilis twelve years before. The gummatous ulceration was on the dorsom of the tongue, and at its posterior border a hard, raised rim suggested carcinoma, which diagnosis was confirmed by the microscope. The right half of the tongue, except at the tip, was excised, the latter being used as a flap.

Pathological Anatomy. Of 368 patients, where the site was mentioned, it was found that the disease was by far more common, as is well known, on the middle third of the edge of the tongue, and there seems to be no difference as to the right or left side. The growth was more frequently noted in the beginning as resembling a wart or pimple, then as an ulcer or sore place, and in a lesser number of cases as a blister, crack, white speck, etc. The state of the lymphatic apparatus was noted in 327

[1] Medical Record, 1907, vol. lxxi, p. 229.

[2] California State Medical Journal, 1907, vol. v, p. 4.

cases, of which 264 showed an enlargement of the lymph nodes, which appeared in 46 cases on an average of 7.6 months after the onset; in 63 cases admitted without enlarged nodes in the neck, the cancer averaged five months in duration, thus showing that some time around the sixth month is the average time for the appearance of metastasis in the neck. Autopsies were obtained in 147 cases, and while metastasis was found in the great majority of cases only in the lymph nodes, yet in 8 the liver was the site of secondary growths, the lung in 7, kidneys in 4, larynx in 4, the suprarenals in 3, the heart in 2, etc.

Clinical Observations. The duration of the growth before admittance to the Middlesex Hospital was noted in 378 cases, and averaged 8.3 months, but 30 per cent. of these were admitted before the third month and 60 per cent. before the sixth month. Of the symptoms complained of by the patients during the early stage of the disease, pain was by far the most frequent, in 2 cases preceding any macroscopic change in the tongue. In 8 patients enlarged cervical lymph nodes brought the patients for treatment. Ninety inoperable cases were observed until they died, and in these the duration of the cancer from the first onset to death was 14.5 months, while in 37 operable cases which were also observed the average duration from the onset was 17.1 month. Most of the patients died from pulmonary causes. The mortality from operation, including deaths occurring within fourteen days, was 12.5 per cent. of all the various kinds of operation performed. The important question of recurrence was investigated in 427 cases, and of these, 48 were patients admitted with recurrence where the primary operation had been done elsewhere. Of 379 new cases, 53.3 per cent. were operated upon, and of these, 67 (33.3 per cent.) returned at a later period suffering from recurrence. Of 90 cases where the site of recurrence was noted, in 33 the mouth was entirely free and the metastasis present in the neck glands only, and of 50 cases dying in the hospital of recurrent carcinoma, 44 per cent. at the time of death showed no recurrence in the mouth. This is of particular importance as showing that the recent contributions of Crile, Hutchinson, etc., do not constitute a plea for a more radical operation, but really indicate the most extreme conservatism, because it is apparent even from these old statistics that the greatest danger in cancer of the tongue, as in cancer in the lip, does not lie in the primary growth, but in the metastasis.

Histologically, 80 of the cancers were examined and found to be of the usual squamous type in 76, and in 4 the microscope showed endotheliomata.

Tonsillar Hemorrhage. Jackson[1] objects to the common method of performing tonsillectomy by slicing off the projecting portion of the tonsil with a tonsillotome. He believes that it interferes with the

[1] Annals of Surgery, 1907, vol. xlvi.

function of the deeper portions of the tonsil, does not prevent the subsequent occurrence of acute tonsillitis, and predisposes to infective arthritis, endocarditis, tuberculosis, etc. Instead, the tonsil should be dissected out of its bed of muscular tissue, capsule and all, by means of tonsil scissors.

He considers oozing after tonsillectomy to be exceedingly rare, the bleeding being due to a spurting vessel behind the anterior pillar simulating oozing. If the latter does occur from the muscular, cicatricial, or other tissue it can be immediately checked by the insertion of a gauze sponge between the pillars. Hemostasis with hemostats promptly done while the vessels are plainly visible by their bleeding immediately after they are severed promptly arrests hemorrhage, and the torsion forestalls secondary hemorrhage. When the bleeding cannot be arrested, or having stopped is likely to recur and be fatal, external carotid ligation should be done at once.

Retropharyngeal Abscess. Acute non-tuberculous abscess situated at the back and side of the pharynx is a condition frequently overlooked and often resulting fatally from asphyxia or from septic bronchopneumonia. Pinches[1] believes that in most cases the abscess results from some inflammatory affection of the tonsil or other lymphoid tissue in the vicinity, because, as a rule, the starting point is found to lie behind one of the posterior pillars of the fauces. The diagnosis rests on the dyspnea, dysphagia, bilateral enlarged cervical glands of recent origin, nasal discharge, stiffness of the neck, elevation of temperature, etc., and detection by palpation of the abscess. Pinches believes that such collections can be opened from within the mouth with the patient recumbent and the head thrown back.

Kempf[2] observed a lymphangiomatous mixed tumor which was diagnosticated as a retropharyngeal abscess. He states that it is difficult to diagnosticate between the two conditions unless a cause for the abscess is present, such as pyemia, spondylitis, diffuse cervical adenitis, etc. He believes that many of these pus collections do not arise, as is commonly believed, from diseased lymphoid structures, but rather from infected "rests," which are so frequent in this region, the "cross-road" in the development of the respiratory and digestive tracts. Through thermic or mechanical irritation they can easily become inflamed and either resolve or go on to suppuration. In the latter event they may rupture spontaneously and disappear, or give rise to chronic suppuration requiring frequent operation. This emphasizes the external operation as the method of choice, owing to the danger of suffocation or infection of the lungs, and opens in front or behind the sternocleidomastoid muscle, depending upon the site of the abscess and direction in which it is pointing.

[1] British Medical Journal, September 28, 1907, p. 813.
[2] Archiv f. klin. Chir., Band lxxxii, S. 931.

THE NECK.

Preliminary Laryngotomy. Bond[1] has for the past fifteen years performed laryngotomy with plugging of the air passages above as a preliminary to larger operations about the upper air passages. Tracheotomy opens up the deeper tissues of the neck, and is usually associated with the suction of blood into the trachea and lungs. Laryngotomy can be simply performed by lifting up a vertical fold of skin and transfixing this for a distance of an inch, the centre of the incision being at the upper border of the cricoid cartilage when the head is extended. A pair of sharp-pointed scissors is plunged through the cricothyroid membrane and widely opened and a tube slipped into the larynx and trachea. The anesthesia can then be given without fear of the inspiration of blood, as the pharynx is packed with a large, flat sponge. Butlin[2] also speaks favorably of preliminary laryngotomy, and has performed it more than a hundred times, thus being in a position to point out a few minor difficulties or complications. He has seen slight subcutaneous emphysema on two or three occasions, and treats it by the introduction of a tiny strip of rubber tissue into the wound in the skin. Slight subcutaneous postoperative bleeding has been encountered and treated by a small piece of gauze packed in the wound.

Suprahyoid Pharyngotomy. After discussing the disadvantages of the nasal, facial, and buccal operations for the removal of nasopharyngeal tumors, Hofmann[3] reports a case of alveolar sarcoma operated by the method of transverse suprahyoid pharyngotomy, which he considers the preferable operation. A slightly oval transverse incision 12 cm. long is made above the bone, and the superficial structures and hyoid muscles divided. The hypoglossal nerve is isolated and guarded and the lingual artery ligated. The pharyngeal mucous membrane is divided and the incision, which gaps but little, owing to the muscular attachments, is retracted. A rubber tube is then introduced through the larynx into the trachea, and, hanging out at the left angle of the wound, is attached to a funnel and the anesthetic continued through it. By retracting the tongue and soft palate a very good view is obtained of the field of operation, but if further room is required the soft palate and the mucoperiosteum of the hard palate may be split and the posterior portion of the hard palate and vomer may also be removed if still more room is required. Hofmann claims that in this operation the bleeding, as a rule, is venous only, and is always under the eye of the operator; should considerable hemorrhage result when removing the growth from the base of the skull, the carotid artery is easily reached through the incision. The split palate can easily be sutured, the cosmetic result

[1] British Medical Journal, January 5, 1907, p. 7.
[2] Ibid.
[3] Archiv f. klin. Chir., 1907, Band lxxxiii, S. 308.

is excellent, and the danger of aspiration of blood is reduced to a minimum. The muscles attached to the hyoid bone must be carefully sutured. During the operation the patient lies in the reversed Trendelenburg position with the head lower than the shoulders.

Ligature of the Common Carotid Artery. With the technique and asepsis of modern times ligature of the common carotid is attended by cerebral disturbances in 25 per cent. and death in 10 per cent. of cases. Jordan[1] believes that before performing such an operation it is possible to ascertain whether disastrous consequences are liable to follow by applying the ligature, *temporarily* for forty-eight hours, loosely to the artery. If no brain disturbances are noted and the pulse returns promptly after the preliminary ligature is removed, permanent ligation of the artery may be performed. If even the slightest brain disturbances follow the temporary ligature, further measures must be abandoned. He has confirmed these observations experimentally and tested them successfully upon a patient with a recurring carcinoma of the neck. He also suggests the value of this procedure where after a wound of a large artery suture of the vessel wall has been required, the ligature loosely applied for forty-eight hours proximal to the suture might promote healing of the vessel wall.

Vaughn[2] reports an aneurysmal varix of the right common carotid artery and internal jugular veins in a colored male, aged fifty-eight years. Two injuries were received in this region twenty-three and nine years before, followed by sharp pain, and after the lapse of one year the presence of a small pulsating swelling on the neck near the jaw. Dysphagia, dyspnea, and tinnitus aurium occurred as the swelling increased in size, hearing in the right ear was impaired, and there was palpitation of the heart. The tumor pulsated and gave a thrill, extended from the ear to the clavicle, and measured 47 cm. in circumference at its base.

On auscultation a low murmur was heard loudest during systole. The patient was operated on, but before anything further than reflection of the flap could be done, death occurred, and was attributed to the ether. A partial necropsy showed that the swelling was caused by the enormously dilated jugular vein causing an aneurysmal sac, which communicated with the common artery by a round opening about 1 cm. in diameter. In this case, and in two other aneurysmal varices, the greatest dilatation of the vein was on the cardiac side of the point of communication. Vaughn suggests the theory that the resistance in the vein is not equal, but is least in the direction in which the venous current flows and greatest in the direction from which the venous current comes, so that the vein on the proximal side is subjected to pressure until the force of the arterial current, so transmitted, is gradually exhausted.

[1] Archiv f. klin. Chir., 1907, Band lxxxiii, Heft 1, S. 23.

[2] Surgery, Gynecology, and Obstetrics, 1907, vol. v, p. 19.

Barling[1] reports a second case of aneurysm of the right subclavian artery treated by ligature of the axillary and carotid arteries, with resulting cure of the aneurysm. The patient was a man, aged forty years, who failed to improve after rest in bed, a limited dry diet, and increasing doses of iodide of potash. The aneurysm was as large as a tangerine orange, and extended from the upper margin of the clavicle in a direction upward and inward, disappearing under the edges of the sternomastoid and trapezius muscles. The carotid was tied one and one-half inches above its origin, and the first part of the axillary immediately below the clavicle. The arm was kept bandaged to the side for twelve months after operation.

Resection of the Cervical Sympathetic Nerve. Lebileau and Schwartz[2] describe a technique for the removal of this nerve. An incision is made along the anterior edge of the sternomastoid muscle from the mastoid process to the level of the hyoid bone. The external jugular vein and auricular branch of the superficial cervical plexus crosses the middle of the incision. After locating the lower edge of the parotid gland, which must not be injured, the cervical fascia is opened a little external to the edge of the sternomastoid muscle. The muscle must then be liberated from the posterior layer of fascia the entire length of the incision, avoiding injury to the spinal accessory nerve. It is better to seek for the sympathetic below this nerve, as above it the muscle is separated from the fascia with difficulty, the connective tissue is denser and more fibrous, and the space is very narrow.

The fascia is then divided on a grooved director outside of the jugular vein, and this vein, the carotid artery, and pneumogastric retracted, the point of the retractor lifting the jugular vein up as the entire sheath is retracted. This retraction must not be too hard, as the sympathetic is thereby made more difficult to distinguish. The nerve can then be found lying on the prevertebral fascia, and can easily be isolated and removed. It must not be confused with the pneumogastric nerve, which lies between the vessels and is retrojugular, while the sympathetic is behind the artery.

Meade[3] reports a bilateral extirpation of all the cervical ganglia at one sitting, with recovery of the patient. The operation was performed on a woman, aged thirty-two years, suffering from an *exophthalmic goitre* of eleven years' duration. The lagophthalmos, with von Graefe's and Stellwag's signs, disappeared in a few hours. About four months after operation the goitre was barely perceptible, the pulse remained below 94, but the exophthalmos was present to a slight degree.

Hinder[4] discourses on the value of cervical sympathectomy, and reported a case recently operated on for epilepsy. Cure could hardly have

[1] Lancet, November 16, 1907. [2] Revue de Chir., February, 1907.
[3] Journal of the Kansas Medical Society, 1907, vol. vii, p. 586.
[4] Long Island Medical Journal, 1907, vol. i, p. 274.

been said to have occurred, however, owing to the short time ensuing since operation and the recurrence of "small attacks of petit mal."

Carotid Tumor. Cook[1] reports the twenty-eighth recorded instance of this neoplasm. It occurred in a mulatto, aged thirty-nine years, and was diagnosticated as an aneurysm of the carotid artery. Microscopic examination revealed the usual characteristics of this tumor. Death occurred one hour after operation.

Cancer of the Neck. Crile[2] adds a further contribution to the surgical treatment of carcinoma which has invaded the neck, and summarizes his results. He emphasizes the importance of posture, avoidance of hemorrhage, tubage of the pharynx, and the formation of a protective zone of granulations, prior to operation, across the base of the neck under cocaine-oxide anesthesia by means of gauze packing. He states "that the only tissue that must be respected, to the extent of determining the breadth of the excision of the growth, is the common or internal carotid artery," the occlusion of which is often followed by cerebral softening. "The sternomastoids, one or both, the omohyoids, the digastric, the sternothyroid, sternohyoid, and platysma muscles, either on one or both sides, need not be considered as of functional importance in weighing the chances for the successful eradication of a malignant growth. On the same ground, neither the internal nor the external jugular, on one or both sides, need be considered, nor a unilateral excision of the vagus, of the phrenic, or of the hypoglossal." Bilateral excision of the vagus or phrenic would, however, be fatal, and bilateral excision of the hypoglossal is usually fatal, on account of pneumonia. Crile's statistics, however, are not particularly convincing as they stand, because prior to 1900 there was no recurrence in 31 per cent. of the patients traced, while from 1900 to 1904 there was no recurrence in 40 per cent. In the first group 65 per cent. were dead from carcinoma; in the last, 60 per cent. As is well known, three years is entirely too short a time in cancer on which to base conclusions, and while I am heartily in accord with Crile's principles, and believe that surgeons must emphasize the local character of carcinoma of the neck, yet conclusions must not be drawn too soon.

Stylohyoid Ossification. Although the occasional recurrence of ossification of the second branchial bar, represented by the styloid process, the stylohyoid ligament, and the lesser horn of the hyoid, has been repeatedly observed in man, yet the number of well-described cases is very small. Dwight[3] believes, after an embryological study and a review of nineteen cases, that the usual term "ossification of the stylohyoid ligament" is wrong and misleading. On the contrary, this condition is due to a continued growth and subsequent ossification of the two bran-

[1] Surgery, Gynecology, and Obstetrics, 1907, vol. v, p. 324. [2] Ibid., p. 91.
[3] Annals of Surgery, 1907, vol. xlvi, p. 721.

chial cartilages. Clinically, he calls attention to the fact that a bony rod may extend from the styloid process to the hyoid bone. It may be slender or thick, flexible and elastic, and passing between the carotid artery may interfere with operations for tying them and with those on the parotid gland, which it probably indents on the inner side. It also may indent or displace the tonsil, and evidently would then interfere with excision of the tonsil by the tonsillotome. It may also give rise to difficulty in swallowing. A diagnosis may be made by manual examination, and the *x*-rays would settle the matter.

Operative Treatment of Muscular Torticollis. Gerdes[1] believes that this condition is best relieved by division of the scalenus anticus muscle, and has obtained excellent and permanent results in eleven cases so operated upon since 1897. While the sternomastoid, scaleni, levator scapulæ, and trapezius participate in producing the deformity, it is the scalenus anticus which when shortened produces the scoliosis of the cervical vertebræ. He makes a transverse incision, about 5 or 6 cm. long, a finger's breadth, above the clavicle and beginning over the tendon of the sternal portion. Both tendons are divided near their origin, as is also the cervical fascia, and the jugular vein is dissected free. The latter is drawn inward and the posterior belly of the omohyoid upward by blunt hooks exposing the scalenus, the phrenic nerve, and the brachial plexus on the scalenus medius. These structures are carefully isolated and the scalenus anticus carefully divided, remembering that it lies over the subclavian artery. He packs the wound for forty-eight hours and obtains healing by granulation. After the fourth day active and passive movements are begun and continued for from three to six weeks. He does not advise a mechanical apparatus, trusting entirely to the early exercises. He advises the operation even in the milder forms of wry-neck as making little more of a scar than tenotomy, and offers it as a substitute for Mikulicz's operation in the more severe ones.

Doehring[2] states that the above is untrue, at least as far as they have observed in thirty-seven operations in Braun's clinic (Göttingen), as the scalenus anticus is not shortened sufficiently to produce scoliosis except where the lesion is extensive and all the muscles are involved. If after division of the sternomastoid the deformity persists, it is usually due to the shortened trapezius fibers. The technique of the operation is also too difficult. He has operated on 35 cases, with good results in all except one, by division of the stretched fibers of the trapezius with abundant overcorrection. Gerdes,[3] in reply, reiterates his position, and states that the operation is very simple after having been once performed.

Bocker[4] reports 120 cases operated upon in Hoffa's clinic since 1898,

[1] Zent. f. Chir., 1907, Nr. 6, p. 145.
[2] Ibid., Nr. 11, p. 298.
[3] Ibid., Nr. 16, p. 451.
[4] Ibid., p. 449.

90 by the Mikulicz (partial resection) method, without a failure, and 30 by Volkman's operation (tenotomy), with unsatisfactory results. He has observed participation of the scaleni in only 2 cases, which were cut. The objection to simple tenotomy is the difficulty in finding and removing the adhesions of the muscles to the surrounding parts, and the deep-lying bands. Aberle[1] states that in Lorenz's clinic they base their treatment of wry-neck upon the ability to correct the cervical scoliosis. While agreeing with Gerdes as to the influence which the scalenus anticus has in the production of scoliosis, yet he does not believe that its division does more than render more easy the task of correcting the deformity. He much prefers tenotomy followed by mechanical correction, because in the Mikulicz method and even in Gerdes operation, the necessity of waiting for healing of the wound offsets any advantages which they may possess. They use a plaster-of-Paris bandage, with the head in the overcorrected position. They have had no failures.

Branchial Clefts. Speese[2] discusses the conditions arising from these congenital malformations, and reports a case of branchiogenic carcinoma. He draws attention to the difficulty met with at times in curing cases of branchial fistula, because of the dense adhesions around the tract and the close proximity of important structures. He draws attention to and reports a case of a so-called branchiogenic abscess, a condition which is of interest both from the diagnostic standpoint and from the fact that such abscesses tend at times to incite malignant degeneration.

The patient, a man, aged forty-three years, was admitted to my service in the University of Pennsylvania Hospital complaining of a swelling in the right side of the neck, which had existed for four months; it was somewhat tender on pressure and occasionally caused slight difficulty or discomfort in swallowing; there was no dyspnea, fever, or loss of weight, nor was there any increase in the number of leukocytes. Upon examination there was no discoloration of the skin, the mass was freely movable, firm but not hard, did not fluctuate, and was firmly connected with the surrounding tissues. The regional lymph nodes were not enlarged. The rapidity of the growth and the absence of inflammatory symptoms or of a primary focus in the throat or mouth led me to believe that I was dealing with a lymphosarcoma, and accordingly a rather grave prognosis was given. The presence of tuberculous disease of the cervical lymph nodes was considered, but was excluded. Even at operation I had no knowledge of the true condition of the mass, but was surprised at the absence of hemorrhage; when the growth was completely removed and opened it was found to contain about four ounces of pus, and only microscopic examination revealed the true nature of the growth.

[1] Zent. f. Chir., 1907, Nr. 28, p. 809.

[2] University of Pennsylvania Medical Bulletin, October, 1907, p. 146.

Speese considers, finally, the subject of branchiogenic carcinoma, and reports a case occurring in a patient, aged thirty-six years, in whom a fluctuating mass was diagnosticated as an abscess and was opened and drained; microscopic examination of the abscess wall revealed a squamous carcinoma. A radical operation was performed at a later time, and three years from the time of the second operation the patient was entirely well, and without any sign of recurrence. The diagnosis should be made upon the characteristic location of a painful tumor, rapid growth, adherence to the surrounding parts, the history of a cyst, and the exclusion of a primary growth elsewhere. The prognosis is grave, recurrence appearing, as a rule, in from three to five months after operation. Speese advises the removal of branchial cysts when possible in order to prevent future carcinomatous degeneration.

Tuberculosis of Cervical Lymph Nodes. Eisendrath[1] believes that this disease may have the following portals of entry: (1) The faucial tonsils, (2) the pharyngeal tonsils or adenoids, (3) a tuberculosis of the temporal bone, (4) through carious teeth, (5) tuberculous lesions of the buccal and nasal mucous membranes.

He combines removal of the adenoids and tonsils with the extirpation of the lymph nodes as a more or less routine measure. Tuberculous lymphadenitis may not always be of the usual chronic form, but sometimes, as in recent epidemics observed in Chicago, may come on acutely with high fever and local inflammatory signs. Occasionally the pseudoleukemic form may be observed when a gradual enlargement of the cervical, axillary, and inguinal nodes occurs without tendency to caseation or perilymphadenitis. In such cases, however, the enlargement of the nodes is not progressive, does not involve the mediastinal nodes, and rarely reaches any great size, as in Hodgkin's disease. Eisendrath prefers the longitudinal incision over the middle of the sternocleidomastoid muscle, and after dividing the deep fascia and freeing this muscle he abandons the scalpel for a pair of short-bladed curved scissors.

Donoghue[2] concludes from a study of upward of 300 cases that enlarged glands of the neck are not, primarily, tuberculous, and bear the slightest relation, if any, to general or pulmonary tuberculosis. They are due to a mixed infection of pus-producing bacilli, and will quickly resolve if the source of infection is removed before disorganization takes place. Such an idea is quite fantastic, and his recommendation of the use of poultices for treatment is as antiquated as is the giving of tonics, iron, etc., which he condemns.

La Fetra[3] reports a case of tuberculous cervical adenitis in an infant, aged four months, without any ascertainable cause for infection. The parents were not tuberculous, the baby was being fed on maternal milk,

[1] American Journal of Surgery, 1907, vol. xxi, p. 257.
[2] Boston Medical and Surgical Journal, 1907, vol. clvi, p. 392.
[3] Archiv f. Pediatrics, June, 1907, p. 418.

and certified milk from a model farm, but it was thought probable that a cold contracted from the father and the street dust were responsible for the infection. The largest and most accessible lymph nodes were extirpated and revealed early, extensive tuberculous disease. Recovery followed. La Fetra calls attention to the necessity of more careful study of this disease, in view of the recent discovery by Harbitz, among others, of the frequency of latent or larval tuberculosis.

Boggs[1] reports 14 cases of tuberculous adenitis treated with the Röntgen rays, in most of which disappearance of the diseased nodes was apparently affected. To be successful, treatment must be energetic and produce a mild dermatitis. It takes on an average twelve treatments, about three a week, to effect improvement, and permanent cure should not be expected for at least three months. Feldstein[2] narrates two cases in which the superior results of *x*-ray treatment over operative procedures is supposed to be demonstrated. In both cases the rays reduced the amount of swelling, but in both there remained on discharge one hard palpable mass, in one case the size of a pea, in the other the size of a grape.

I have abstracted this paper merely to emphasize the fact that reports of cures of tuberculosis or cancer by the *x*-rays must not be taken too seriously. Any surgeon with experience in the diagnosis of cervical enlargements knows the difficulty of accurately palpating the size of the contents of the neck beneath the cervical fascia, and these patients will be fortunate if they do not experience a return of the disease.

Injuries to the Thoracic Duct in the Neck. In view of the great number of operations performed upon the neck and the ease with which the thoracic duct may be injuried, Stuart[3] reports a case observed in his own practice and draws conclusions from thirty-nine additional cases collected from the literature. He emphasizes the fact that the usual description of the duct as a single channel throughout its course is erroneous, as such a condition is an anomaly. More usually a delta formation is present, or it may terminate in two or more important branches which enter different veins. The duct may also open into the vein in an unusual situation, into the left subclavian, left internal jugular, right internal jugular, or the right subclavian. It sometimes communicates with various veins during its course upward through the abdomen and thorax, and such an anomaly like the delta formation would prevent death from inanition after section of the duct.

Most of the cases occurred during operations for tuberculous nodes in the neck and malignant disease. The latter were usually recurrences at the lowest part of the posterior triangle of the neck, secondary to breast carcinoma. As a result of traction on the chain of nodes the

[1] St. Louis Medical Review, December, 1906, vol. liv, p. 601.
[2] New York Medical Journal, 1907, vol. lxxxv, p. 20.
[3] Edinburgh Medical Journal, October, 1907, p. 301.

thoracic duct was pulled outward, and as the narrow neck of alveolar tissue is cut the duct is divided completely or partially.

The injury will be recognized during the operation by the sudden flooding of the wound with a clear or milky fluid and the rhythmical jetting of this fluid at each expiration from the cut end of the duct or a wound in its wall. If the injury is not noted and the wound closed, a large effusion will be discovered, raising the skin in the supraclavicular region when the wound is dressed, and followed by a fistula with profuse chylorrhea.

If the wound is drained the dressings soon become soaked with a milky fluid possessing a sweet or mawkish odor. Emaciation is rapid and progressive, and is accompanied by general lassitude and dejection, feebleness, pallor, thirst, scantiness of urine, and sometimes tachycardia, headache, giddiness, and syncope. There is constant hunger. It is especially to be noted that there are no local inflammatory signs or fever in the absence of sepsis. Death occurred in five of the forty cases, although Stuart believes several of those should be excluded. He concludes that the best treatment, if the wound is recognized during the operation, is ligature of the peripheral end, either alone or with ligature of the central end. Suture of the wound should only be attempted in very favorable cases, and packing is only justifiable if it is impossible to apply a ligature. If the wound is not recognized until after the operation, firm packing results in cure with or without a short-lived fistula, and if this fails, the wound may be reopened and a ligature or forceps applied to the duct. Firm supraclavicular pressure may be tried if the wound is firmly closed and the accumulation is recognized as being chylous. De Forest[1] also writes an extensive article upon this injury and also prefers suture as the ideal method, or, if that is not possible, the use of a ligature.

Cervical Rib. This developmental anomaly can no longer be considered uncommon, as the literature each year contains many references to its occurrence, and it is only when serious symptoms of pressure occur that it becomes of interest to the surgeon.

I have previously[2] referred to the development, anatomy, and symptomatology, and this year will be content to refer to Keen's complete monograph[3] and discuss the surgical treatment. The pain and sensory disturbances, the atrophy of the muscles of the arm and consequent loss of function, the pressure on the arterial trunks, causing gangrene of the fingers and aneurysm, are serious results which have been hitherto observed requiring operation.

Keen collected 42 cases that had been operated on from 1861 to the autumn of 1906. In this series of operations the mortality has

[1] Annals of Surgery, 1907, vol. xlvi, p. 705.

[2] PROGRESSIVE MEDICINE, March, 1906, p. 101, and 1907, p. 83.

[3] American Journal of the Medical Sciences, February, 1907, p. 173–218.

been nil, and with but few exceptions the result has been all that could be desired. Three different incisions have been used: First, parallel with the clavicle as for ligation of the subclavian; second, vertical or obliquely vertical at a suitable position and angle between the sterno-cleidomastoid and the trapezius muscles; third, a combination of both, angular in shape, especially adaptable to a short, stout neck. The clavicle could be divided, but this is unnecessary. The superficial vessels should be ligated and divided if in the way. By blunt dissection the rib is exposed both anteriorly and posteriorly as far as possible, dissecting off the scalene muscles if they are inserted into it. The dome of the pleura must be carefully avoided, especially if the rib is attached to the first dorsal rib, and if wounded, as has been done in five cases, must be instantly closed by the finger and then by packing with iodoform gauze. The rib is then removed as far as necessary, both backward and forward, with chisel or saw, and the stump at each end rounded off with the rongeur forceps. Care must be taken to remove the periosteum. In uncovering and removing the rib the close proximity of the brachial plexus and subclavian vessels must be remembered and avoided, especially guarding against traction of the former, as in a few cases paresis or paralysis has been a more or less permanent sequel. The wound is closed with or without drainage. The after-treatment should consist of massage of the arm, electricity, and passive and active movements. A complete bibliography is appended.

Thymic Tracheostenosis. Jackson[1] reports a case of thymic asthma cured by thymectomy, and states that it is the seventh such case on record, the first case demonstrated radiographically, and the only case in which the mechanical pathology of the disease was proved by direct tracheoscopic examination of the living patient. Jackson believes that despite the opinions of Friedlepen, von Kundrat, d'Escherich, etc., an hypertrophic thymus can compress the trachea sufficiently to obliterate its lumen, but he considers "thymic asthma" a term to be used only for cases supposed to be associated with neuropathic, convulsive, lymphatic, rachitic, hemic, or other lesions.

The asphyxia is best treated by a long tracheal cannula, bronchoscope, or similiar tube which will reach below the point of obstruction and the enlarged thymus removed through a transverse incision after double sternomastoid tenotomy. The thymus is hooked up by the finger passed into the mediastinum behind the sternum, but this should be done quickly to prevent cardiac inhibition from compression of nerve trunks about the esophagus.

The Thyroid Gland. CONGENITAL STRUMA IN THE NEWBORN. While congenital enlargement of the thyroid gland is not especially uncommon, yet its treatment by operation, during infancy, is an unusual occurrence. Fischer[2] reports an operation for this condition performed on an infant

[1] Journal of the American Medical Association, 1907, vol. xlviii, p. 1753

[2] Beit. zur klin. Chir., 1907, Band 54, S. 161.

one hour after birth, in which severe dyspnea threatened asphyxia. The operation was done without anesthesia and the enlarged right lobe removed. Recovery followed. The mother was suffering from a goitre during pregnancy.

Peterson[1] reports a somewhat similar case when operation was performed upon a five-weeks-old infant for a tumor which turned out to be a large right lobe. Thyroidectomy was followed by tetany on the ninth day, although the author states that the parathyroids were not removed.

INTRATHORACIC GOITRE. Verebely[2] believes that the thyroid may occupy an intrathoracic position from two points of view: (1) *Developmental*—due to a thyreoptosis of the entire gland, an embryonal condition, an abnormal position of the lateral lobes, or the formation of an apophysis from the isthmus or lower poles. (2) *Acquired*—from the extension of a diffuse goitre into the thoracic cavity, or nodules and cysts that extend into the chest.

Monnier[3] noted that in 670 goitres there were 114 in which either the right lobe (47), the left lobe (62), or the isthmus (5) occupied a retrosternal position. In 17 of these the goitre was completely intrathoracic. The diagnosis of such goitres sometimes presents great difficulty, and the following symptoms are considered to be important: Severe dyspnea with a small goitre, marked displacement of the trachea, fixation of the trachea, dilatation of the veins of the neck, recurrent nerve paresis or paralysis, paralysis of the sympathetics with enophthalmos, contracted pupil and ptosis, suffocation, the findings by the *x*-rays, and by tracheoscopy.

Monnier also frequently noted the occurrence of "retrovisceral" positions of accessory nodules either behind the trachea, the pharynx, or the first part of the esophagus. Berry[4] observed 7 intrathoracic goitres in 268 patients with goitre, and remarks upon the great necessity for early operation in such cases from the extreme danger of suffocative dyspnea.

GOITRE. Two contributions have added to our statistical knowledge of this disease, and while figures possess a lesser degree of value when treating an individual case, yet they possess a collective value as a means of pointing out the symptoms indicative of various pathological lesions, and indicate often the lines along which treatment had best proceed. Berry[5] analyzes the results of his last 274 cases of removal of goitre by operation, and states that these are in direct continuation of a former series, making 400 in all. The 274 operations were performed on 268

[1] Medical Record, 1907, vol. lxxii, p. 1002.
[2] Deut. Zeit. f. Chir., 1907, Band lxxxix, S. 106.
[3] Bruns' Beit., 1907, Band liv, S. 39. [4] Lancet, November 16, 1907, p. 1368.
[5] Ibid., p. 1366.

patients, and represent the work of six and one-half years. Monnier[1] reports the operations upon 670 patients performed in Krönlein's clinic during a period of fourteen years.

These statistics in many details differ greatly, but together, nearly 1000, give us some valuable facts. Goitre affects women more frequently than men, 88 per cent. (Berry) and 68 per cent. (Monnier), and generally speaking is most common before forty years of age, after which period the number of cases become markedly less. Berry separates the age periods according to the pathological character of the goitre, and shows that while the average age for the simple or parenchymatous goitre is twenty-one years, the age for adenoma averages almost thirty-eight years. This point emphasizes the necessity for surgeons to recognize the distinction between these two forms of goitre, owing to the danger of the development of adenocarcinoma. In Berry's cases 73 per cent. were adenomas, and in 10 per cent. additional the parenchymatous enlargements contained adenomatous nodules. In two-thirds of the cases dyspnea was the principal reason that led to operation, and in Monnier's statistics practically every patient presented this symptom; but, as the latter pertinently remarks, they came from goitrous districts, where the deformity alone was very common and practically never brought them to operation for cosmetic reasons. Berry believes that the dyspnea in benign goitres is always caused by direct pressure upon the trachea, and has little or no relation with irritation of the recurrent nerve, an opinion which is concurred in by Monnier, who states that they have observed little influence upon the dyspnea where paralysis or paresis of the vocal cords was present. But the latter author places great value upon this finding as indicating the position of deep-lying portions of the goitre pressing upon one or the other recurrent laryngeal nerve. In only 6 per cent. of his cases was the trachea normal in shape, being dislocated to left or right even as much as 4 to 5 cm. Both authors lay emphasis upon the presence of dysphagia as indicating the position of the goitre, and Berry points to its value, frequently suggesting the diagnosis of malignancy.

Cardiac disturbances were noted in 170 of Monnier's cases, and he follows Minnich in dividing them into two types: (1) The pneumatic form (Rose's thyroid heart), in which the circulatory disturbance is due to the tracheal stenosis resulting in hypertrophy and dilatation of the right heart, and symptoms of vertigo, dyspnea on exertion, palpitation, oppression, tachycardia, arhythmia, etc.; and (2) the thyreopathic form (thyreosis), where the heart is directly affected by the perverted secretion of the diseased thyroid, and resulting in the production of a symptom complex often termed "*formes frustes*." The importance of these lesions is made manifest by the influence which they have upon the mortality,

[1] Beit. zur klin. Chir., 1907, Band liv, S. 23.

and even in some cases where the heart seemed normal before operation, arhythmia, tachycardia, or palpitation were observed after strumectomy. In two of the three deaths in Berry's series death was due to cardiac failure shortly after the operation.

Operation in Goitre. Berry prefers intraglandular enucleation when an encapsuled tumor is present, and extirpation when the goitre is in the form of a more or less general enlargement and when multiple adenomas are present in a parenchymatous goitre. He modifies the former by performing resection enucleation, especially when the growth is large. In describing resection extirpation, where he leaves a layer of the posterior portion of the gland described, he claims as advantages the ability to avoid the recurrent nerve and the leaving of sufficient gland to carry on its function, and yet, curiously enough, never once refers to the importance of avoiding the parathyroids. He never observed tetany or myxedema following his operations. Monnier prefers resection to enucleation, because bleeding is greatly diminished, secondary hemorrhage is less common, and the guarantee against recurrence is greater. But resection enucleation was also performed 108 times in the Zurich cases, thereby, it is stated, better to avoid the parathyroids. Both Berry and Monnier drain their cases with rubber for several days, and the former assists the drainage, especially in old people, by postural methods. The latter writer also describes in great detail the postoperative temperature. The mortality in Berry's series of 267 benign cases was 1.1 per cent., and in Monnier's 670 there were 11 deaths (1.6 per cent.).

After-results. Berry, unfortunately, does not publish the after-results of his cases, and so we must use Monnier's results alone for this important point, which is invariably neglected in our own literature. Monnier examined 125 of his operated cases and found that in 82 per cent. the dyspnea for which, it will be remembered, they had been operated upon had been entirely relieved. In 13.6 per cent. marked improvement was present. It is extremely interesting here to note that in 36 per cent. the trachea failed to return to its normal position after the operation, remaining permanently bent 2, 3, or 4 cm. from the middle line. As to recurrence, Monnier notes that in over one-half of the 125 patients the remaining portion of the thyroid had undergone hypertrophy, which in 15 cases could be considered as being marked. He states that the size of the goitre or the character of the operation seems to have little influence, the recurrent growth depending more upon the character of the thyroid tissue, the vascular colloid (parenchymatous) and adenomatous varieties being most likely to recur.

Delore and Chalier[1] report the detailed histories and deductions of 73 patients operated upon for thyroid lesions, in Poncet's clinic

[1] Revue de Chir., October, 1907.

at Lyons. Of these, 61 suffered from goitre, the great majority of which were of the adenomatous variety, either solid or cystic. There was only one death in this series, this being a woman with a large, fleshy goitre, which was easily removed, but the patient died three weeks later from bronchopneumonia and empyema. The authors state that they were much struck with the frequency of hemorrhage in the cystic goitres, and this statement is often made in recent reports of such tumors, but anyone who has studied the gross appearance of adenoma of the thyroid gland is familiar with the frequency of hemorrhage. In the Surgical Laboratory of the University of Pennsylvania we have only two or three adenomas which are not hemorrhagic, and, as is also well known, most cysts arise from the softening of solid adenomas or from liquefaction of hemorrhagic foci. They also note, as did Kocher some years ago, that some difficulty may be met in acute hemorrhage, both in diagnosticating from malignant growths and in the danger to the patient from compression. Operation is indicated when symptoms of compression, especially of the trachea, present themselves, in retrosternal, fibrous, cystic, or hemorrhagic goitres, in exophthalmic goitre, and in the thyroid psychoses.

Operation Methods. They have discarded puncture followed by injections because they are not only ineffectual but dangerous. But, like many French writers, they still cling to exothyreopexie when severe functional disturbances preclude operation by other measures. They, of course, perform partial thyroidectomy and resection in diffuse goitres, but emphasize the value of enucleation in adenomas, when it can be performed, even with multiple nodules, when they are few in number and separated from one another by layers of normal thyroid tissue. They prefer Kocher's incision, split the subhyoid muscles where they anatomically meet, and make transverse incisions when necessary, suturing the muscles at the conclusion of the operation. They drain for three or four days, thus avoiding infection, hematomas, and thyroid intoxication from absorbed secretion. General anesthesia is preferred, except in cases of cachexia or serious respiratory difficulty. They do not begin anesthesia until ready to commence operation, and use ethylchloride followed by ether or chloroform. Asphyxiation can be relieved by operation with the patient in the erect position by luxating forward the goitre or by removal of a cyst. They have had no tetany, no myxedema, no serious nervous sequelæ.

Anesthesia. With hardly an exception the German surgeons use local anesthesia, partly because of its great safety when dyspnea is a prominent symptom, and partly because of the ability to avoid the recurrent laryngeal nerve by having the patient talk while approaching the posterior portions. As has been stated, Delore and Chalier prefer chloroform or ether preceded by ethylchloride. Mayo[1] uses general

[1] Surgery, Gynecology, and Obstetrics, July, 1907.

anesthesia almost invariably. Tinker[1] prefers local anesthesia. Berry,[2] in England, prefers chloroform, having used local anesthesia but five times, while Barker prefers the latter. So it is apparent that, except in Germany, surgeons differ widely in their views upon this subject, and I, myself, agree with Mayo that there is "but little difference in the shock or general condition of the cases from the anesthetic employed." It is probable that in Germany, as Monnier has stated, goitre patients are so used to the frequency of the deformity that they only come to operation when dyspnea is marked and, in most cases, the trachea narrowed and distorted. It is evident that ether in such cases, by paralyzing the extrinsic muscles of respiration, makes breathing very difficult and asphyxia of frequent occurrence. But all surgeons who use general anesthesia agree that it requires but little of the anesthetic carefully given by a most competent anesthetizer and preceded by morphine about one-half hour before operation.

The upright position, the collar incision, and the frequent use of drains are universal, and the Mayos apply Harrington's solution over the cut tissues to close the lymph absorbents and favor drainage if the cut area is large. Barker[3] prefers local anesthesia after the following technique:

He uses a solution of 2 per 1000 of β-eucaine in normal saline, prepared fresh by adding a powder containing β-eucaine 3 grains, sodium chloride 12 grains, to 3.5 ounces of distilled water. This is boiled for a few minutes, then cooled to blood heat. To this, when cooled, is added 10 drops of adrenalin chloride solution 1 to 1000. This purposely makes a weak solution, but it is used in large quantities. The skin is infiltrated in the usual manner, and then a long, blunt needle, closed at the end and having an eye near the point, is thrust through the skin, previously punctured by a straight Hagedorn needle, at one corner of the curved skin incision. The fluid is thus injected into the subcutaneous tissue for a couple of inches on either side of the incision, crossing the track of most, if not all, of the branches of the cervical plexus. The needle is next thrust through the other horn of the incision and the infiltration repeated, and then pushed between the deeper layers of the cervical fascia round the capsule of the thyroid.

About 100 to 150 c.c. is required, and analgesia is at its height at the end of from forty to sixty minutes. He gives morphine sulphate, gr. $\frac{1}{4}$, shortly before the operation. He does not use drainage.

The Relation of the Recurrent Nerve to Goitre Operations. From the study of the literature and three observed cases, Stierlin[4] considers paralysis of the vocal cords following strumectomy. He especially

[1] American Journal of the Medical Sciences, 1907, vol. cxxxiv, p. 188.
[2] Loc. cit. [3] Practitioner, 1907, vol. lxxix, p. 329.
[4] Deut. Zeit. f. Chir., 1907, Band lxxxix, S. 78.

draws attention to the fact that when the patient is discharged both vocal cords may be found freely movable, and yet, sooner or later, subsequent phenomena may indicate that in one or both a total or partial recurrent paralysis may be demonstrated. When one makes a point of examining with the laryngoscope after strumectomy these secondary paralyses are easily recognized. When this is not done the results of the goitre operation may be erroneously construed, as in a case observed by Stierlin, where a paralysis of the right vocal cord was not observed until seven weeks after the removal of a right-sided thyroid tumor.

The author believes that a study of statistics of reported series of goitre operations will show a percentage of paralysis entirely too great for modern methods. The nerve is especially apt to be injured, first, where it crosses the course of the thyroid artery, and, secondly, in the latter part of its course where it enters the cricopharyngeal muscle. Stierlin prefers local anesthesia for all local operations, in order by it better to free the nerve. After carefully isolating the inferior thyroid artery he locates the nerve. He especially contends against the haphazard use of hemostats on adjacent tissue, and finds a valuable aid in the recognition of the nerve in the "bell-pull phenomena," the tugging of the nerve by the vagus, to which in turn is transmitted the pulsations of the carotid artery. Monnier[1] observed complete paralysis of one vocal cord after operations upon retrosternal (4) and retropharyngeal (4) goitres, and in 8 additional cases a paresis of one or other of the vocal cords occurred.

WRYNECK AND SCOLIOSIS as a result of goitre which produces severe dyspnea are complications rarely mentioned when discussing this disease, but Henschen[2] writes a very interesting paper upon them. He groups the deformities as follows: (*a*) *Symmetrical Deviation.* (1) *Congenital struma,* which in infancy interferes with the normal development of the thorax, will eventually result, especially in those constitutionally weak, the rachitic, or cretins, in dorsal kyphosis. If the struma remains stationary the bones forming the upper thoracic opening become so curved as to gradually enlarge the space, and the development and strengthening of the muscles may adjust an exaggerated dorsal kyphosis and diminish the chances of a costovertebral ossification. (2) Cervicodorsal kyphosis, where an immense, often cystic goitre hangs down over the chest, and by its weight causes a kyphosis from bending of the head and neck. (3) A goitre incarcerated between the jaw and the sternum, a retrosternal goitre, or a median "plunging goitre" may produce a temporary or more rarely a permanent lordosis of the neck. (*b*) *Asymmetrical (lateral) deviation,* due to the presence of a goitre producing an asymmetrical condition of symmetrical muscle groups. The concave muscle considerably outdoes the convex in mechanical power,

[1] Loc. cit.

[2] Archiv f. klin. Chir., Band lxxxiii, Heft 3, S. 860.

and, pulling on the head and neck, a scoliosis results from the compensation necessary to keep the head straight.

Monnier[1] observed that in eight patients with retrosternal goitres a scoliosis of the cervical and thoracic vertebra was present, in six of which general conditions, especially rickets, acted as predisposing causes, the other two being dependent purely upon the goitre.

EXOPHTHALMIC GOITRE. The literature upon the surgical aspects of Graves' disease is not so voluminuous as in previous years, because of the stimulus which the work of Beebe and others has given to serum therapy. The symposium upon exophthalmic goitre at the Fifty-eighth Session of the American Medical Association is representative of the present status of this disease, and again it is to Kocher that we turn for the most comprehensive description of the methods and results of surgical treatment.

Albert Kocher[2] reviews the work of his father in Berlin, where to date 3460 operations for goitre have been performed, 315 operations having been done on 254 patients afflicted with exophthalmic goitre. The mortality in these operations was 3.5 per cent., only 9 of the 254 patients having succumbed, an achievement which is a lasting monument to the skill and judgment of the elder Kocher. Before operation is attempted upon exophthalmic goitre three points must be definitely determined and their significance carefully weighed: (1) The relation between the blood pressure, the size of the heart, and the tachycardia. A low pressure and a dilated heart, or one which easily dilates, after exertion or excitement, requires careful treatment of the patient and the avoidance of an immediate extensive operation. (2) An extensive operation is not warranted if the degree of intoxication is great, especially when the gland is highly vascular with expansile pulsation. (3) An examination of the blood, which if it reveals no increase of the lymphocytes indicates a serious degree of the disease. Kocher next takes up the results obtained in the 254 patients, and states that 83 per cent. of all cases were cured, 9 per cent. were greatly improved (4.8 per cent. because secondary organic changes were present, and 4.4 per cent. presented special forms of the disease or had complicating diseases), and the remainder are either still under observation or have refused further operation, being satisfied with their present condition. Kocher gives but little satisfaction to the surgeon eager to know how to operate, or what to do in the different classes of the diseases. He states that "every patient is a law unto himself," and merely mentions ligation of two thyroid arteries or partial excision, if the case is moderately severe, especially with vascular symptoms. If the latter symptoms are wanting, medical treatment may cure; but if it does not, or relapses occur and vascular symptoms come on, a surgical operation must be performed. If the disease is severe in its manifestations, and especially if lympho-

[1] Loc. cit.

[2] Journal of the American Medical Association.

cytosis is absent, medical treatment, especially cytotoxic serum, is indicated.

In chronic cases operation, while of great benefit, must be carefully considered because the organic changes in the heart and hypothyroidism may lead to disaster. Kocher also states that exophthalmos is mostly caused by the dilatation of bloodvessels in the orbit, and its continuance after relief by operation is due to the chronic distention of the vessels of the eyeball, with resulting inability to contract. In conclusion, he urges operation, because no matter which way we look at the cause, the hypertrophic thyroid tissue or its blood supply is reduced and the gland enabled to re-adapt itself to the combating of the primary causes of the disease. In the discussion upon this symposium, Halsted referred to some 90 operations with 2 deaths, and Mayo stated that he and his brother had had 176 cases of hyperthyroidism with 9 deaths.

C. H. Mayo[1] divides the disease into four types: (1) The soft, vascular, pulsating thyroid with symptoms of hyperthyroidism; (2) the hard, dry gland of hyperthyroidism (the usual type); (3) the development of hyperthyroidism in those with preëxisting goitres; (4) pseudohyperthyroidism due to excessive absorption at irregular intervals from a gland, the seat of the tumor, such as an encapsulated adenoma. As contra-indications to operation he mentions (1) a pulse which cannot be counted continuously because of uneven tension; (2) gastric crises or diarrhea; (3) ascites and edema of the feet.

These symptoms can be overcome by suitable treatment. He recommends ext. of belladonna and quinine internally, and the use of the x-rays in sufficient strength to discolor or even burn the skin until the general condition improves and the operation is considered safe. When operating they carefully preserve the posterior capsule to avoid injury to the parathyroids, and in 490 operations have only seen one very mild case of tetany of a temporary nature. Great care must be exercised in ligating the superior thyroid artery, as death from hemorrhage may occur from including some of the fibers of the omohyoid muscle in the ligature, which may be dislodged by movements of the neck. They wash the wound with Harrington's solution and establish free drainage through a separate incision for two or three days. Large saline enemata under slight pressure are given, or hypodermoclysis if these are not retained. Atropine is used for sweating, morphine for restlessness, and hot, moist boric compresses are applied to the front of the neck. The patients are gotten up in three days. There were 10 deaths (5 per cent.) in 196 cases.

Several writers, mostly quoting from Mayo, refer to the necessity of preserving the posterior capsule to guard against injury to the parathyroids and the resulting tetany (vide infra).

Halsted[2] proposes the operation of "ultra ligation." This operation

[1] Ohio State Medical Journal, 1907, vol. iii, p. 179.

[2] Annals of Surgery, October, 1907, vol. xlvi, p 49.

is performed in the usual manner of performing goitre operations up to the point where delivery of the thyroid is attempted. Halsted first grasps the superior pole only, and pulls it forward and toward the midline in order to avoid the rupture of some bloodvessels and consequent staining of the field containing the parathyroid glandules. The superior pole can be safely and fearlessly grasped, because there are no vessels behind it likely to be torn; the upper end being thus liberated, delivery of the entire lobe is done by alternately relaxing and compressing, and avoiding undue pressure on the trachea.

From above downward, and from before backward, the vessels as they bind or as they present must be clamped and divided at the point of entrance into the gland as far peripherally as possible. Except in the case of the larger branches, it is usually unnecessary to clamp the distal end of the cut vessel, hemorrhage from which is prevented by the pressure of the traction. In the immediate neighborhood of the recurrent laryngeal nerve, at what Halsted calls "the erroneously termed hilus," sharp-pointed clamps should be plunged into the thyroid gland, seizing the vessels after they have disappeared from view in its substance. Halsted considers ten minutes ample time for the removal of a thyroid lobe in a moderately difficult case of exophthalmic goitre. He prefers general anesthesia with ether, insists on experienced nursing, and agrees with Mayo that saturation of the patient with water must be accomplished one way or another. Halsted suggests the use of chilling or freezing the neck before and after the operation for Graves' disease, in order to delay the processes of repair and absorption and thus bridge over the period of greatest danger—the two or three days succeeding operation.

He also suggests that in order to avoid toxemia from infection of the wound surfaces by the thyroid secretion a small, vertical skin insertion might be tried, thus removing the thyroid through a hole just large enough to permit the delivery of the lateral lobe.

X-rays in Exophthalmic Goitre. Freund[1] has treated 5 cases by *x*-rays with satisfactory results, in 3 of them this was the only form of treatment used. In all the weight increased, the nervous and vascular symptoms disappeared, and the thyroid returned to its normal size. The *x*-rays fulfil the "causal indication" in that they cause shrinkage of the goitre in addition to a disappearance of the other cardinal symptoms. The soft, vascular goitres give the most favorable prognosis, and the earlier they are treated the more rapidly does the gland resume its normal size. Faber,[2] at Rovsing's clinic, has applied Röntgen treatment in simple and exophthalmic goitre cases. In 4 cases of the former marked diminution in the size of the thyroid occurred, in 1 case the

[1] Münch. med. Woch., 1907, Nr. 17, S. 830.
[2] Hospitalstidende, 1907, vol. I, p. 881.

goitre subsiding to one-half its former size. In 8 cases of exophthalmic goitre the results are described as being truly remarkable; 1 case in particular, where seven applications of the x-rays were given in twelve days, subsiding completely and remaining cured at the end of four months.

PARATHYROID GLANDS. Much has been written during the past year upon these little bodies, and much remains to be investigated and balanced before our knowledge becomes exact, and yet a retrospect of what has been done shows that we have passed the threshold.

Since Sandström, in 1880, first recognized the parathyroids, and Gley, in 1891, demonstrated experimentally their influence in the production of tetany, there has been a steady accumulation of anatomical and experimental facts which today have given rise to the opinion that tetany following goitre operations is the direct result of loss of parathyroid function. There has, of course, been much divergence of opinion, and even recently Vincent and Jolly,[1] Caro,[2] and Forsyth[3] express varying degrees of doubt in regard to the opinion shared by the majority of observers. During the past year Pool[4] and Halsted[5] have written extensive and interesting articles upon tetany as being due to hypoparathyreosis. Pool, Erdheim,[6] and Monnier[7] have reported cases of tetany after goitre operations, and the former has reported a large number of experiments upon rats. Both Erdheim and Pool append full bibliographies.

To the previous investigations upon the number of the parathyroids nothing new has been added, as Pool found an average of 2.9 parathyroids per person in 16 autopsies, and Forsyth, in an examination of nearly 60 human subjects, concluded that in less than one-half there was one, in about one-quarter two, and in the remainder there were three, four, five, or even six glands on each side of the neck. As to the arrangement, Pool states the superior glandule lies close to the thyroid in the middle third of its posterior portion, approximately on the level of the lower border of the cricoid cartilage, the gland being more frequently found posterior on the left side than on the right. It lies in a plane posterior and external to the terminal branches of the inferior thyroid artery and recurrent laryngeal nerve. The inferior lies at or below the inferior pole of the thyroid on the posterior aspect of the lower third, in which case it is frequently found anterior to the recurrent laryngeal nerve and inferior thyroid artery, close to the thyroid gland at the entrance of the lower twigs of the artery. The most striking variation which Pool found was the presence of a large parathyroid on the anterior surface

[1] Lancet, 1906, p. 430.
[2] Mitt. a. d. Grenzgeb. d. Med. u. Chir., 1907, Band xvii, Hefte 3 and 4.
[3] British Medical Journal, November 23, 1907.
[4] Annals of Surgery, October, 1907, p. 507.
[5] American Journal of the Medical Sciences, July, 1907, p. 1.
[6] Mitt. a. d. Grenzgeb. d. Med. u Chir., 1906, Band xvi, S. 632.
[7] Loc. cit.

of the isthmus. Forsyth[1] found that in position the most constant sites were, first, at the junction of the middle and lower thirds of the lobe beneath the inferior thyroid artery; second, at the junction of the superior and middle thirds of the thyroid, and therefore above the inferior thyroid artery; third, at the inferior pole or in the adjacent connective tissue.

In size they varied from little more than a pinpoint to nearly 2.5 cm. Another interesting observation is that the parathyroids occur in greatest number in the first year of life, and from that period to old age they are formed with progressively decreasing frequency. Forsyth also observes that accessory thyroids are most common in the same localities as parathyroids.

Getzowa[2] has described accumulations of parathyroid cells as occurring within the thyroid. Halsted and Evans[3] discuss the blood supply of the parathyroid glandules, and state the following facts: (1) The parathyroid glands are always supplied by definite parathyroid arteries which enter them, in each case, at the hilus. (2) The parathyroid arteries, superior and inferior, usually arise from the inferior thyroid, but frequently they take origin from the anastomosing channel between the inferior and superior thyroid vessels. Occasionally there are additional types of origin. (3) Few, if any, vascular connections normally exist between the thyroid glands and the connective tissue envelope of the thyroid. The parathyroid bodies are situated in man much lower than in dogs. The higher of the two glands of one side usually being situated at about the level of the junction of the upper and middle thirds of the lateral thyroid lobe. The lower of the two is usually not far from the lower pole, but may be several centimeters below it, even within the bony thorax. They are situated with great regularity on or very near the posterior portion of the lateral lobe of the thyroid gland, and more or less in the line with the channel of anastomosis between the superior and inferior thyroid artery. Recurring to the blood supply, they note that the parathyroid artery is very large in proportion to the organ supplied, and the glandules, being quite free, hang from the artery like cherries on a stem. In appearance they are ovoid and flattish, slightly granular and without difficulty distinguished from the adipose or thyroid tissue. Forsyth[4] believes that the parathyroid secretes a colloid substance which appears indistinguishable from the colloid of the thyroid. This appears not earlier than the third month of life, and is extruded as drops which coalesce, pass into the smallest of the lymphatic channels, and so drain away from the gland. From an examination of the parathyroids in 50 human subjects and over 70 different species

[1] British Medical Journal, February 16, 1907, p. 372.
[2] Virchow's Archiv, 1907, Band clxxxviii, S. 181.
[3] Annals of Surgery, October, 1907, vol. xlvi, p. 49.
[4] British Medical Journal, May 18, 1907, p. 1177, and November 23, 1907, p. 1508.

of animals and birds, he arrives at the following conclusions relative to the different theories:

Vitally Essential Theory. He states that all previous work has been open to the objection that it failed to take into account the variability in the number and position of the parathyroids, the fact that they may be remote from or buried out of sight from the thyroid, are often microscopic in size, and, further, they cannot be identified except by the microscope.

Embryonic Theory. He states that competent observers, especially Welsh, Verdun, and Groschuff, experienced no difficulty in distinguishing between the parathyroids and embryonic thyroid tissue.

Forsyth's Theory. They are functionally the same, the difference being in the vigor of secretions and lymphatic drainage of the two glands, as the colloid is indistinguishable from thyroid colloid. He believes that the gross anatomical features of the parathyroids point to the thyroid as the organ to which they bear an intimate relation. The essential differences histologically simply lie in the arrangement and number of the epithelial cells in each of the compartments formed in either gland by the connective-tissue trabeculæ.

Erdheim[1] reports three cases of tetany developing shortly after thyroidectomy, and resulting fatally on the one hundred and thirty-first, fifth, and seventeenth days. Postmortem examination showed sufficient thyroid tissue to carry on function, but marked interference with the parathyroids. Serial sections were made, and showed in the first case that none of the four usual parathyroids was present, although two small accessory glandules were present in the thymus measuring 1 and $\frac{1}{3}$ mm. respectively. In the second case the left upper glandule was found, but was in a necrotic condition. In the third case no trace of parathyroid tissue was found.

Monnier[2] reports one case of tetany following thyroidectomy which resulted fatally in a little over eight months, in which no mention is made of parathyroid destruction. A second case, in which one of the parathyroids was recognized and left undisturbed while performing a left enucleation resection, developed tetany, but the symptoms immediately ceased with the administration of thyroid extract and chloral. Monnier suggests that the operation may have caused a functional disturbance of the parathyroid, which was recovered from. Pool[3] reports the case of a woman, aged thirty-three years, who some years previously had had the left lobe of the thyroid removed for goitre, but two years later dyspnea, dysphagia, and swelling returned and increased to such an extent that a second operation became imperative. Pool found in the region of the isthmus a round, smooth mass about $2\frac{1}{2}$ inches in diameter, extending downward behind the sternum and

[1] Loc. cit.

[2] Loc. cit.

[3] Annals of Surgery, October, 1907, vol. xlvi, p. 507.

compressing the trachea. The thyroid gland was clamped at the junction of the isthmus and the right lobe, and cut across as close to the tumor as possible. Before doing this, it was found necessary to ligate the inferior thyroid artery, which ran close to the tumor. The entire right lobe was left and the wound was closed with drainage.

The healing of the wound was uneventful, but on the fourth day after operation tetanic contractures occurred in both hands. There was occasional twitching of the facial muscles, and these were followed by cramps in the feet and calves, together with forcible plantar flexion of both feet. After that for about thirteen months the patient presented the typical clinical features of tetany, the flexor muscles of the hands, wrists, and feet being most conspicuously affected. Chvostek's and Trousseau's signs were present and typical almost all of the time. As regards treatment, various thyroid and parathyroid preparations by mouth and hypodermically were tried. One saline injection of 24 ounces was given, and five parathyroids were implanted subcutaneously. Improvement, with gradual disappearance of the symptoms of tetany, was coincident with the repeated administration of Beebe's nucleoproteid in large doses hypodermically, and occurred from four to six weeks after the first implantation. No effect can be attributed to the therapeutic measures, but it was also possible that an hypertrophy of the upper right parathyroid body, supposed to have been left, may have occurred.

Halsted states that the parathyroids can be almost infallibly recognized with the naked eye in the course of an operation, while Pool considers that it is merely a matter of chance, and that their recognition could not be depended on. I think that most operators will incline to the latter view.

Tuberculosis of the Parathyroids. Stumme[1] reports an example of this rare disease in a woman, aged twenty-six years. She presented symptoms of Basedow's disease, Chvostek phenomena, and a soft compressible goitre with a hard nodule below the isthmus. Four months after extirpation of the right lobe of the thyroid, an accessory thyroid and a caseated parathyroid she was much improved.

Parathyroid Transplantation. Leischner[2] reports in detail experiments performed upon rats in which the parathyroids were removed and immediately transplanted into the abdominal wall. Those implantations remained for periods of between ten days and a month, during which time there were but few symptoms, and upon removal the animals immediately developed a fatal tetany. The transplanted bodies were recovered in all cases, and showed practically no change. Leischner advocates for patients suffering from tetany after thyroidectomy that a single parathyroid may be transplanted from another patient who

[1] Deut. Zeit. f. Chir., 1907, Band xc, S. 265.
[2] Archiv f. klin. Chir., 1907, Band lxxxiv, S. 208.

is being operated on for goitre. He cautions, however, that such extirpation should only be attempted when the enucleation of a simple, unilateral, and intracapsular growth was being performed, and when the remaining parathyroids remained entirely untouched. He also observes that the recognition of the parathyroid is often attended with difficulties, owing to the closeness with which masses of fat, lymph nodes, or accessory thyroid nodules may resemble it.

THE THORAX.

Carcinoma of the Breast. At the last meeting of the Congress of American Physicians and Surgeons one of the subjects for general discussion was the end results of operations for carcinoma of the breast. A number of prominent surgeons took part in the discussion, and the statistics and data presented give us an excellent idea of what may be expected in the hands of competent surgeons. Mumford[1] epitomizes the teaching of the various surgeons as follows: Cancer of the breast should be removed with a great skin margin; with a wide dissection of adjacent fat and subcutaneous tissue; with excision of both pectoral muscles; occasionally with stripping the fascia from the numerous neighboring muscles; with thorough cleaning out of the axilla, and when the axilla is involved beyond its base, with dissection of the neck as far as the bifurcation of the carotid. Palliative operations should be performed, if possible, with the Paquelin cautery, and in all cases the wounds should be treated subsequently with the *x*-rays for at least six weeks.

In conclusion, he states that the figures are so numerous and the writers and speakers so prolific that one could pile up a great number of familiar or curious facts, but the main points of the story have been brought out, and the discussion summed up in the following fashion:

The speakers in Washington dealt with 1194 cases, and an end mortality of 56.63 per cent., including all varieties of breast cancer, patients of various ages, and growths of various development. The case surviving longest without recurrence is a patient of Dennis'. Twenty-nine years have passed since her operation.

Of the 1194 cases reported, 518 are now alive and in good health, after more than three years have passed since their operation.

Operations varying greatly in extent and severity were done by these speakers—operations varying from palliative to extensive mutilating dissections.

Handley's explanation of the permeation of cancer meets best our understanding of the conditions of spread, metastasis, and recurrence of the disease.

[1] Boston Medical and Surgical Journal, November 7, 1907.

Extensive axillary involvement implies supraclavicular involvement, and calls for extensive dissection in a great number of cases. Cancerous glands in the neck do not point necessarily to a hopeless condition.

Palliative operations should be executed with a Paquelin cautery as far as possible.

Recurrence in the scar is becoming less common as we appreciate increasingly the importance of removing wide disks of skin. Internal metastasis is most common in the lungs, mediastinum, liver, spine, brain, humerus, and, occasionally, the femur.

Even pessimists will admit that these results, representing the work of widely scattered groups of surgeons, show a great advance over what we knew when this generation was ten years younger.

TABLE I.

	Cases.	Operative mortality. Per cent.	End mortality. Per cent.	Well after three years. Per cent.
Halsted	210	1.7	57.7	42.3
Oliver	35	—	62.85	37.15
Greenough	376	3.6	79.1	20.9
Cabot	42	—	78.1	21.9
Dennis	(50)	—	(22)	(78)
Willy Meyer	80	1.25	65.0	35.0
Pilcher	18	—	72.0	28.0
Vander Veer	87	—	19.54	80.46
Ochsner	98	5.1	45.0	55.0
Jonas	177	2.3	40.7	59.3
Jacobson	71	—	46.4	53.6

The marked variation in these figures may be explained in part by judicious selection of cases exercised by some operators, by the higher mortality obtained in general hospital practice, or, as in Dennis' figures, by restricting the report to those cases which had already passed the three-year limit. The value of the three-year limit was discussed, and it was concluded that so arbitrary a period could no longer be regarded as of any value. It may be stated, however, that the longer the patient survives the operation the less prospect there is of recurrence. Ransohoff reports a case living and well twenty-nine years after the operation while numerous surgeons have observed recurrences eight, nine, ten, eleven, fifteen, seventeen, nineteen, and twenty-one years after the primary operation.

Greenough's tables show that medullary carcinoma is the most frequent form of breast cancer and the variety which has the highest mortality, both immediate and ultimate. Scirrhus stands next, adenocarcinoma being far less malignant, and the colloid variety the most favorable form of all.

TABLE II.

	Cases.	Cases surviving radical operation.	Cases free from recurrence.	Per cent.
Medullary	136	104	19	18.2
Scirrhus	46	43	10	23.0
Adenocarcinoma	24	21	10	47.6
Colloid	4	3	2	66.0
Cancer, variety not specified	127	107	18	16.8
No pathological report	39	31	8	25.8

TABLE III. Carcinoma of the Breast. Pathological Varieties. (Halsted.)

	Cases.	Cured cases.	Per cent.
Cancer cysts	6	2 (1?)	33.3
Adenocarcinoma	32	24	75.0
Medullary carcinoma	25	12	48.0
Circumscribed scirrhus	28	13	46.4
Small infiltrating scirrhus	80	30	35.5
Large infiltrating scirrhus	39	8	20.5
Total	210	89	

Greenough points out also that out of 8 cases of Paget's disease but 1 survived, an end mortality of 87.5 per cent. On the other hand, cancer developing in the lactating breast (commonly regarded as an extremely grave condition) showed an end mortality of but 71.5 per cent. in 7 cases. Cancer developing during gestation is probably more fatal than during lactation.

Halsted's remarks on glandular involvements are extremely interesting. Of a total of 232 cancer cases, only 168 showed any evidence of metastasis in the axilla. In other words, we may expect to find the axilla involved in 72.4 per cent. only. But this must not mislead us, for in nearly a quarter of Halsted's cases which were free from axillary involvement, metastasis occurred sooner or later; so that he is driven to remark: "We must bear in mind, however, that surely in some, probably in many, cases, if not in most of the axillæ recorded as negative, there was disease." Regarding these glands Greenough says: "It is quite probable that in early cases, without palpable enlargement of the glands, the disease is entirely within the glands and can be readily removed; whereas in glands which are palpably enlarged the disease has extended through the capsule and along the lymphatic trunks and become disseminated through the axillary fat to such an extent and in such minute strands that complete removal is very difficult, if not impossible of achievement." Our understanding of Handley's theory of cancer permeation makes the supposition of Greenough highly probable.

Attention was directed to the early diagnosis of cancer, particularly by Halsted; the physician should remember that 80 per cent. of all breast

tumors are malignant. By most minute examination we may detect very small cancers which do not give the other cardinal signs, thus making both breasts take the widest possible excursions on the chest wall under the skin; even slight shortening of the trabeculæ may be detected. A diagnosis may be justified even when there is no sign other than an almost imperceptible pull. . . .

The prognosis is influenced by the histological character of the tumor and its location. Those situated centrally or in the lower third of the base give a much larger percentage of recoveries than do growths located elsewhere.

OPERATIVE TREATMENT OF BREAST CANCER. After radical operations on the breast the resulting immobility of the shoulder is frequently a source of great annoyance to the patient. In order to prevent this Ewald[1] recommends the following technique: The arm on the operated side is raised by adhesive plaster, or is supported by a sling at the elbow. The patient is placed in bed and remains in this position for three or four days. The arm is allowed to hang when she leaves the bed, but when in bed the arm is always elevated. Within two weeks the patient can raise the hand above the head. The cavity which remains when the axillary fat and nodes are removed does not become filled up with blood and lymph, because the skin is stretched over the axilla and the thorax. Schlesinger[2] believes that just as good results may be obtained if the arm is bandaged to the side with a pad in the axilla. The cavity of the axilla is more thoroughly obliterated by this dressing than by the elevated position recommended by Ewald, and the function of the arm is restored within three weeks. According to Berndt[3] equally good results may be obtained if the arm is dressed at right angles to the body.

It is equally important, as Porter says,[4] to avoid infection and keeping the wound surfaces in close apposition until healing is complete. The latter is best accomplished by means of a few buried sutures at the apex of the axilla and a properly adjusted compress held in place by adhesive plaster. Complete closure of the wound may be secured and drainage dispensed with in nearly all cases if the incision is properly made, hemostasis complete, and tension sutures introduced.

REGRESSIVE CHANGES IN CARCINOMA. Of the more common changes in mammary carcinoma should be mentioned fatty degeneration followed by atrophy, hyaline degeneration of the connective-tissue framework, and calcification. Gelatinous degeneration is quite rare. Lange described 17 cases of colloid carcinoma in 1814 cancers of the breast. In these cases the cancer cells become gelatinous partly as a result of atrophy and fatty degeneration; the colloid degeneration affects chiefly the stroma. Colloid carcinoma is usually of slow growth, affects elderly

[1] Zentralblatt f. Chir., 1907, Nr. 14. [2] Ibid., Nr. 34.
[3] Ibid., Nr. 38.
[4] Journal of the American Medical Association, August 31, 1907.

individuals, and does not tend to extend to the axillary lymph nodes until late in the course of the disease. The lymph nodes may present the usual lesion of an ordinary carcinomatous infiltration, or may show colloid changes. The prognosis is relatively good in early operations; in neglected cases, however, ulceration and distant metastases may occur.

The case reported by Dixon[1] is of interest because of the duration of the disease. There was a history of a benign growth, which had been present for almost fifty years and had been quiescent for the last twenty. On removal it was found to be an adenofibroma. Two years later there was a rapid enlargement of the breast with subsequent ulceration of the skin and infection. After the inflammatory symptoms had subsided the breast was removed and the secondary growth found to be a colloid carcinoma. This instance cannot be regarded as a malignant degeneration of the previously existing benign growth, for the latter was completely removed, nor can it be regarded as a recurrence.

Bone Metastasis. It has been shown by Handley that bone metastasis of breast carcinoma occurs very rarely in areas not invaded by subcutaneous nodules, and that the liability of such metastasis increases with their proximity to the site of the primary growth. This would seem to point to a distinct relation between the subcutaneous invasions and secondary bone deposits. The carcinoma cells reach the bones by way of the lymphatics along the fascial planes. Attention has been called[2] to Handley's theories particularly with reference to epigastric extension. The vertebræ, femur, ribs, humerus, and skull are the most commonly affected. The first indication of a secondary carcinoma of the bone oftentimes is a spontaneous fracture. Wharton[3] reports five cases in which the bones were secondarily involved, including the vertebræ, clavicle, humerus, and skull, and the femur in three cases. The most conspicuous symptom is localized pain, and occasionally on examination the bone is found to be thickened. In cases involving the long bones the patients should be informed as to the liability of fracture, and proper precautionary measures adopted.

Mixed Tumors of the Breast. The tumors may be recognized by the following facts: They are well circumscribed, often remain stationary for a long time, and then suddenly increase in size; never extend into the mammary tissue, but cause atrophy of the latter by pressure; they are frequently movable, are not attached to the skin or underlying tissues, and the regionary lymph nodes are never involved. Many theories have been advanced as to the origin of these growths. According to Wilms they are due primarily to a misplacement of embryonic cells; these anlage are in the breast tissue at a very early age, remain latent for a long period of time, and under the necessary stimulation

[1] Denver Medical Times, June, 1907.
[2] Progressive Medicine, March, 1907.
[3] Annals of Surgery, July, 1907.

grow and produce the so-called mixed tumor. Wilms believes these cells capable of reproducing not only glandular but also various forms of connective tissue.

Sick[1] reports among 732 tumors of the breast 5 cases of cystosarcoma; 2 of these Wilms classifies as mixed tumors and 1 as a chondrolipoma.

Sarcoma of the Breast. Surgeons have not paid as much attention to sarcoma of the female breast as they have to the study of cancerous affections. This is due partly to the relative infrequency, and part to the less malignant character of the lesions. As to the frequency of sarcoma, Finsterer found 48 sarcomas seen among 800 tumors representing 6 per cent. of all growths of the breast. He divides his cases into the following varieties: (1) cystosarcoma, of which there were 18 cases; (2) fibrosarcoma, 10 cases; (3) myxosarcoma, 5 cases; (4) round-cell sarcoma, 6 cases; and (5) lymphosarcoma, 1 case. Of the 40 patients, 30 were married, 10 single; 10 of these have never given birth to children. The following table shows the average incidence, particular attention being called to the fact that only 1 case appeared before the twentieth year:

TABLE IV.

Age at which disease began.	Cysto-sarcoma.	Spindle cell sarcoma	Round cell sarcoma.
Under 20 years	1 (17 years)	0	0
21–30 "	2	2	0
31–40 "	4	4	2
41–50 "	8	4	4
51–60 "	2	2	1
61–70 "	1	3	–
	18	15	7

It appears that lactation and inflammatory conditions of the breast play a less important role than in the case of carcinomatous affections, although traumatism, which was observed in 60 per cent. of the cases, seems to be an important etiological factor. Hereditary predisposition can practically be excluded in sarcomatous affections.

In carcinoma there is a fairly constant clinical picture, but this is not true of sarcoma, because of the wide variation in the histological character of the growth. With regard to the general condition of the patient, even in the case of a relatively large tumor of long duration, there is less constitutional disturbance. The patients appear healthy, and in spite of repeated recurrence often show no evidences of cachexia; even in advanced cases cachexia is rarely marked. The tumor is found more commonly in the left breast than in the right, 23 times on the left side as compared to 16 on the right; in 1 instance both breasts being involved. There is no tendency to involve any particular quadrant of the breast,

[1] Mitt. a. d. Hamb. Staatskrankenanstalten, Band vii, Nr. 2.

as in carcinoma. The lesion begins as a small, freely movable nodule, varying in size from a bean to a walnut when first observed. The rate of growth is very variable; in some cases the tumor grows very rapidly, while in others a nodule may appear to remain stationary for a long period and suddenly increase rapidly in size. The latter sequence of events rather suggests sarcomatous degeneration of a preëxisting benign growth. The cystic and spindle-cell sarcomata require a relatively longer time for their development than carcinoma. The round-cell sarcoma is the more malignant. The size of the tumor varies according to its duration and the nature of the growth. It is well known that cystic sarcomata may attain large dimensions, at times being as large as a man's head. The consistency is usually hard, although in the round-cell variety it may be elastic. When the skin is tightly drawn over the growth it may be difficult to determine whether there is any fixation of the skin to the tumor. In Finsterer's series the axillary lymph nodes were enlarged in only 8 cases; upon microscopic examination 3 of these proved to be inflammatory.

The diagnosis of mammary sarcoma is often very difficult; a small sarcoma, existing for but a short period, may, because of its movability, be mistaken for a fibro-adenoma. The ulcerating spindle-cell sarcoma, especially if the glands are enlarged, may be mistaken for carcinoma. In the presence of a growth of firm consistency which increased rapidly in size in a short period, but was not associated with lymph-node involvement or fixation to the underlying muscles, one would incline toward a diagnosis of sarcoma. The prognosis depends upon the nature of the tumor, upon the extent of the operation, and upon the duration and local extension of the disease at the time of operation. The best results are obtained in cases of cystosarcoma; two-thirds of the cases have remained free from recurrence from eight to twenty-six years after the operation. In the fibro-cell and spindle-cell types recurrence occurs in about 66 per cent. of cases, and in the round-cell type only one out of seven remained free from recurrence. The radical operation should conform closely to that employed in cases of carcinoma.

Benign and Malignant Cystic Tumors of the Breast. According to Bloodgood,[1] cysts of the female breast vary from the benign to the most malignant form of tumors. Frequently a differential diagnosis between a benign and malignant cyst cannot be made from the clinical history and examination, and the recognition of its precise nature is possible only after incision. Galactocele, a rare tumor, results from dilatation of a duct in a lactating breast, and may arise during or at various intervals after lactation. The skin and nipple remain normal in appearance unless secondary infection occurs. Fluctuation can, as a rule, be elicited. Bloodgood states that he has never seen malignant degeneration of a

[1] Johns Hopkins Hospital Bulletin, April, 1907.

galactocele. The treatment is conservative and simple; the plastic operation of Warren may be employed with satisfactory results. Cysts in the lactating breast may be due to pyogenic infection with the formation of chronic abscesses. One case is reported in which swelling, without any of the signs of inflammation, was observed in the fourth month of lactation. Four months later there was a tumor the size of a fist involving the entire nipple and outer quadrant; the nipple and skin were normal; there was no fever and no disturbance of lactation. The operation revealed a large abscess filled with pus.

Cancerous cysts may appear in the lactating breast, and not differ clinically from the cases above noted. On inspection, however, the cyst wall is usually found to be thicker and more distinct, the lining zone is white and granular instead of red. Cysts frequently appear as a part of other pathological processes, as, for example, in chronic cystic mastitis and papillary cystadenoma, both of which have been described elsewhere. Cancerous cysts in the non-lactating breast have a distinct cyst wall, which may resemble somewhat the wall of a simple cyst or one containing a papilloma. As a rule, the wall is thicker, and the diagnosis usually can be made from the hemorrhagic contents of the cyst, which is always suggestive of malignancy. Attention is directed toward this form because of the danger of mistaking it for a benign growth. A case recently seen at the University Hospital showed undoubted malignant characteristics, both clinically and pathologically. The discoloration of the skin and distended veins, together with the adherence of the growth to the surrounding tissues, were very susggetive of malignancy. Upon removal the contents were found to be hemorrhagic, and the cyst wall presented a distinct trabecular appearance characteristic of carcinoma originating from the epithelial lining of a cyst. The operation in these cases should be just as radical as in any other form of cancer. Bloodgood also describes a rare sarcomatous cyst which contained clear fluid, and a wall composed of soft, friable, granular tissues.

Dermoid cysts may be benign or malignant, and may be so situated that they closely resemble a primary breast tumor. The wall in benign dermoids is thin, easily enucleated, and the contents typical. When malignancy develops, however, the wall thickens (3 x 5 mm.), becomes adherent, and thus makes its removal more difficult.

Benign Tumors of the Breast. Much attention has been given in recent years to the pathology as well as the surgery of the benign tumors of the mammary gland, as a result of which we have a very much clearer conception of the subject and a greater realization of the incidence of the danger of malignant degeneration in benign conditions.

The classification of Warren[1] was intended primarily to prevent con-

[1] PROGRESSIVE MEDICINE, March, 1906.

fusion in nomenclature and to promote accord between surgeon and pathologist. Further elaboration of the various subdivisions of his classification, which seems the most practical yet submitted, have been made by several investigators. Thus Greenough and Simmons[1] have made an extensive study of those fibro-epithelial tumors which are classified as epithelial in type and termed papillary cystadenoma. From their study of twenty cases they have drawn the following conclusions: (1) They were single or multiple, involving the large ducts near the nipple, and composed of one or more cyst cavities, from the walls of which grew papillary outgrowths composed of a fibrous-tissue stroma and a luxuriant growth of duct epithelium in the form of irregular gland tubules and polypoid projections. (2) Tumors of this character have been described by many names, viz., adenoma, duct papilloma, etc. (3) They occur in the male breast as well as in the female. (4) They occur at all adult ages and indepedendent of trauma, marriage, or location. (5) They are usually painless. (6) They are generally situated near to or beneath the nipple. (7) They are usually of small size, but occasionally attain the dimensions of an orange. (8) They are of slow growth. (9) Their most characteristic symptom is the presence of a discharge from the nipple, which may be serous, but is usually bloody in character. (10) They do not cause enlargement of the axillary glands. (11) Fifteen per cent. of the twenty cases in this series were associated with the form of cancer (adenocarcinoma) of a relatively low type of malignancy. (12) Treatment demands the complete removal of the tumor, either by excision, or, if necessary, by amputation of the breast. (13) Excision may be performed by plastic resection or by an areola incision. (14) The association of cancer with papillary cystadenoma in 15 per cent. of the cases justifies the separation of this group from other fibro-epithelial tumors of the breast in the clinical and pathological classification.

Saar[2] corroborates the above findings, and adds, in conclusion, that cystadenoma of the breast is a new-growth, in which the epithelium plays the leading role, the connective-tissue elements exerting very little influence. He believes that there is a definite connection between this disease and the process of involution.

Under the term "hyperplasia" Warren classified his cases of abnormal involution, otherwise known as "chronic cystic mastitis" (König), the latter term being adopted by Greenough and Hartley, who have made the most exhaustive investigations into this disease. Bloodgood[3] advocates the term "senile parenchymatous hypertrophy" for the same condition. This term, however, seems too unwieldy, and has no distinct advantage over chronic cystic mastitis; the latter is now almost

[1] Annals of Surgery, February, 1907.
[2] Arch. f. klin. Chir., Band lxxxiv, Nr. 1.
[3] Surgery, Gynecology, and Obstetrics, December, 1906

universally adopted, and should, therefore, be retained. Bloodgood observes, and rightly, too, that for practical purposes it makes no difference whether the condition is viewed as an inflammation, a benign neoplasm, or an hypertrophy. The important fact to be borne in mind is that the lesion has a benign and a malignant stage. In the benign stage two types are recognized, the cystic, which rarely undergoes carcinomatous degeneration, and the adenocystic.

It is in this form, the adenomatous proliferative group of Greenough and Hartley, that the danger of malignancy is so great. It is impossible to determine clinically when these proliferative changes begin, thus the danger of procrastination, for at any time the lesion may overstep the bounds of benignancy and become malignant. The tendency, therefore, for surgeons to operate early in all cases of chronic cystic mastitis is based upon a firm, pathological basis, and undoubtedly, if persisted in, will tend to lower the number of carcinomata of the female breast. In at least 15 per cent. of the cases of chronic cystic mastitis evidences of malignant degeneration may be found.

Speese[1] reported 12 cases of this disease; 25 per cent. were malignant, but this percentage is probably too high, because of the relatively small number of cases. However, as pathological examinations are being made more regularly, and as specimens previously not subjected to examination are now being sent to the pathologist for an opinion, malignancy in chronic cystic mastitis will prove to be more common than hitherto supposed. Not the least important phase in the consideration of benign diseases of the breast is the operative treatment. If still in the precancerous stage, the growth should be removed by a plastic resection. Since Warren introduced this procedure it has met with universal approval, and is followed by gratifying cosmetic results. I have used it in all benign conditions of the breast, and in many cases of chronic cystic mastitis, with signal success. In only one case could the areas of induration be said to have recurred, the removal of such tissue practically always resulting in cure. Bloodgood advocates the complete operation in those instances which present the evidences of malignancy. This does not seem to me to be too radical, and may be a means of saving the patient the annoyance and danger of a second operation.

Treatment of Mastitis by Passive Congestion. It is unnecessary at this time to discuss the rationale of the Bier treatment; suffice it to say that in Bier's application of an old principle we have a means more effective than any other in combating and limiting inflammatory processes. No more gratifying results have been obtained than in the application of this treatment to mastitis and mammary abscess. With this treatment we dispense with the long radiating incisions, the gauze, and tubular drainage, the removal of which caused so much discomfort and pain and the protracted convalescence.

[1] University of Pennsylvania Medical Bulletin, January, 1908.

Hyperemia in the breast is produced by means of a large suction cup to which is attached an exhaust pump. The use of rubber tubing applied to the base of the cup is recommended by Zacharias,[1] who believes that pressure from the edge of the cup may result in tissue necrosis, and that this tube not only obviates such dangers, but renders the application of the suction far more comfortable to the patient. The method is particularly indicated in early cases, when it usually succeeds in abating the inflammatory process and securing resolution without suppuration. Even if this desired result is not obtained, and abscesses have formed, only very small incisions will be required for drainage, as in the cases treated by Heil.[2]

As in cases of infection elsewhere, so with the breast, the characteristic feature of passive congestion is the rapid relief of pain. Other points of advantage are the small incisions that are necessary, the avoidance of unsightly scars, and great reduction in the period of convalescence. Tharhecke[3] gives the average, in his cases, of five days for mild cases, twelve days for medium cases, and ten to fifty days for severe ones. In general terms it may be said that the period of convalescence is reduced from one-half to one-third. During the period of treatment the child may continue nursing, provided the nipple and the tissue immediately surrounding it are free and there has been no tendency for the pus to break into the milk ducts.

The method of application is very simple; suction can be made once or twice daily, depending upon the severity of the infection. Interrupted treatment, *i. e.*, suction for five minutes with a pause of three, seems to afford the most satisfactory results. If incisions are made drainage is unnecessary; the affected part may be covered with dry gauze or wet compresses secured in place with a firm bandage. Härtmann[4] has learned from experience that hyperemia should not be discontinued too early, and that pressure from the suction jar on an inflamed part is not only painful, but may prove a source of danger by pressing pus and organisms into healthy adjacent tissue.

Pathology of the Male Breast. The pathological conditions of the male breast have been considered in detail by Finsterer.[5] Of 4031 carcinomata, he found that 1.59 per cent. affected the male breast. Congenital accessory breasts or nipples occur, according to Leichtenstern, as commonly in men as in women. They are seen most commonly under the normal breast, somewhat toward the median line, although numerous instances have been reported in which the lesion occupied some other portion of the thorax. It is a question whether these accessory glands can become a starting point for malignant for-

[1] Münch. med. Woch., 1907, Nr. 15.
[2] Gynec. Rundschau, 1907, Heft 5.
[3] Med. Klin., 1906, p. 973.
[4] Münch. med. Woch., 1907, Nr. 15.
[5] Deut. Zeit. f. Chir., Band lxxxiv.

mation; when they are in a position which predisposes them to traumatism they should be removed.

The benign tumors are relatively not as common as malignant ones. Wilms found in 1422 neoplasms that 25 affected the male breast, of which 19 were malignant and 6 benign. The rarest forms are the fibromata and the adenomata, and although the existence of these growths has been denied, a sufficient number of cases have been accurately described to refute any argument. Occasionally we find lipomata and myomata. The majority of benign tumors have been combinations of connective tissue and epithelium, the so-called fibro-adenoma or cyst adenoma. Most of them are small and circumscribed; when associated with cyst formation the mass may become as large as one's fist. Occasionally these growths involve the entire gland, but usually they are not adherent to the surrounding tissues, although as a result of inflammatory changes the skin may become fixed. The lymph nodes are not involved. Finsterer describes eleven cases of *carcinoma* in the male, and refers to many others which have been recorded from time to time in literature. Clinically the disease occurs at a more advanced age, about the fifty-fifth year in the male as compared to the forty-fifth year in the female. Occasionally very young male patients are affected, the youngest patient being twelve and others seventeen, twenty-one, and twenty-two years of age. Hereditary predisposition and traumatism seem to be predisposing factors. The lesion begins as a small, round, movable node under the skin, usually lying directly under the nipple and of slow growth. The average time elapsing from the beginning of the growth until the patient consults a physician is from eighteen to twenty-five months; in the female the average time is ten months. Occasionally, however, owing to the rapid growth of the tumor, the attention of the physician is directed to it at a much earlier time. Only in exceptional cases do these tumors produce pain, and while the growth is slow and of long duration, it rarely attains large dimensions. In advanced cases the tumor is firm in consistency, and sooner or later becomes adherent to the skin and underlying parts. The reactionary lymph nodes are very commonly involved. The prognosis is good, but owing to the few cases reported it is difficult to express this in figures. Histologically about 88 per cent. of the cases are of the scirrhus type; occasionally glandular forms occur.

Sarcoma. The infrequency of connective-tissue neoplasms in the male lends additional interest to the case described by Connell.[1] The patient was twenty-five years of age, the tumor started in a congenital discoloration of the skin near the right nipple, and in three months had grown to the size of a walnut. The breast and axillary lymph nodes were removed, and eight months later there was no evidence of a recurrence.

[1] Surgery, Gynecology, and Obstetrics, January, 1907.

The prognosis of sarcoma is fairly good: various statistics show cure after four years in 13 per cent.; no recurrence after five years in 75 per cent.; and recurrence in 21 to 25 per cent. After studying the literature the author concludes that the male breast is involved in 5 per cent. of all malignant neoplasms, and in about 1 per cent. of all breast tumors. The spindle-cell variety is the most common form (50 per cent.). In a series of 18 cases, 11 recovered; 2 recovered, 1 with keloid formation and 1 with erysipelas; 1 was treated successfully with Coley's fluid; 3 died after the first, and 1 after the second operation. In addition to the case of keloid formation at the site of operation, above referred to, a second case is reported by Painter.[1] In the latter case the keloid followed a suppurative inflammation with extensive tissue destruction. The pressure of the keloid elicited much pain. Amputation was recommended, but refused. These cases are interesting because of the rarity of keloids in the white race, and also because both developed in the breast. Amputation for keloid might seem advisable in cases in which pain was a conspicuous symptom. In milder cases, however, less radical measures, such as the *x*-rays, would be more appropriate.

Surgery of the Lungs. The difficulty in diagnosis and the unusual gravity of surgical lesions in the lungs combine to make the operative results far from brilliant. With the use of the bronchoscope and *x*-rays more accurate diagnoses should be possible, and with the aid of these appliances which exclude pneumothorax, the dangers of operation are reduced to a minimum. Friedrich,[2] in an extensive review of lung surgery, tells us that intervention has given particularly brilliant results in *echinococcic infections*. Stschegolew[3] reports a successful instance in which, the sac being removed from the lung, a cavity the size of an orange remained, which healed readily by granulation. Tuffier reports 61 cases, of which 91 per cent. recovered. This is in itself a very excellent showing.

Gangrene and abscess of the lung are among the affections most commonly treated surgically. It is scarcely necessary to differentiate clinically between abscess and gangrene, because the two conditions are associated so commonly and the indications for treatment are almost identical. One should consider the acuteness or chronicity of the process, whether it is central or peripheral, located in an upper or lower lobe. The prognosis depends generally on the duration of the disease; the earlier an abscess or gangrene is subjected to surgical interference the better the prognosis, and conversely. The long-standing chronic cases are generally fatal. Stimson[4] successfully drained an abscess of three months' duration in a boy, aged nine years, and Maylard[5] a septic

[1] American Journal of Clinical Medicine, January, 1907.
[2] Arch. f. klin. Chir., Band lxxxii, Heft 4.
[3] Zent. f. Chir., 1907, Nr. 27.
[4] Texas Medical News, January, 1907.
[5] Glasgow Medical Journal, 1907, p. 404.

cavity which had produced symptoms for four or five years. When the lesion occupies a high position extensive resection of the ribs may be necessary, whereas a less extensive operation is required in abscesses located in the lower portions of the lung. Lenhartz[1] has operated upon 85 cases of gangrene, 5 abscesses, and 11 *bronchiectatic cavities* in the lung; 53 of the 85 cases of gangrene recovered and 32 died; among the cures were many cases which surely could not have recovered without operation; 4 of the 5 abscesses were cured. In cases of bronchiectasis the prognosis depends altogether upon the duration of the disease; one case which had persisted for a year healed four weeks after a resection of three ribs. In chronic cases the mere opening of the thorax without removal of pulmonary tissue is insufficient. In 3 cases the symptoms, especially the bronchorrhea, were relieved by extensive resection of lung tissue.

The diagnosis of *pulmonary neoplasms* of primary origin is very difficult, although some assistance may be obtained from the *x*-rays and the bronchoscope. Partial excision of the lung has been performed for cases of secondary carcinoma, which have extended to the lung from without, but without much success. Lenhartz has seen 26 cases of carcinoma, and states that the diagnosis is not so difficult if the sputum is carefully examined for fat globules, and if proper attention is directed to the physical findings, the *x*-rays, and an exploratory puncture. Of the 4 cases which came to operation, 3 were inoperable and in the fourth a large portion of the affected lung was removed. The operation was followed by the use of the *x*-rays, and the patient was apparently cured, as there had been no recurrence one year after operation. These tumors, if diagnosticated early enough, may be completely removed. Gluck,[2] from his extensive experiences, has shown that even an entire lobe of the lung can be excised.

There is very much less conservative surgery practised in *wounds of the lungs*, and a correspondingly greater tendency to immediate exploration of the seat of injury. A successful operation of this character is recorded by Mertens.[3] The patient was stabbed in the fourth intercostal space. A large amount of blood was seen escaping from the wound situated near the nipple. A thorough examination was impossible because of the restlessness of the patient and the marked anemia. Surgical intervention seemed indicated because of alarming hemorrhage and the possibility of a wound of the heart. Accordingly a flap composed of skin, muscle, and ribs was turned inward and the pleura exposed. From a rent in the pleura blood spurted with considerable force. The lung was seized with forceps and drawn into the wound, the edges of both the lung and the pleural wounds were then sutured with fine catgut so that both defects were closed. There was a transi-

[1] Zent. f. Chir., 1907, Nr. 31. [2] Archiv f. klin. Chir., Band lxxxiii, Heft 2.
[3] Ibid., Heft 1.

tory emphysema of the face and neck which rapidly disappeared. In seven days the lungs had expanded completely. Such injuries are occasionally followed by hernia of the lungs, an interesting case of which was observed by Germer.[1] As no wound of the thoracic wall could be discovered, the author attributed the hernia to an injury of the intercostal nerves, and consequent atrophy of the muscles. The hernia which developed several weeks after the injury was about the size of a walnut, between the sixth and seventh ribs. It increased gradually in size until it was about 9 cm. in length and could not be completely reduced. The symptoms were relieved by the application of a compress.

Injuries of the lung parenchyma usually follow crushes, falls, bullet or stab wounds. Pneumothorax and hemorrhage are the most constant symptoms, while emphysema is a frequent complication. The latter appeared in 11 out of 29 cases of rupture of the lung, according to the figures of Schwartz and Dreyfus.[2] Friedrich's fatal cases were due in 2 instances to rupture of an intercostal artery, in 3 to rupture of the lung, 1 of which was complicated by a laceration of the liver.

Traumatic pneumothorax often disappears in a few days, although in some cases it may increase to such an extent as to cause alarming pressure symptoms. In such cases puncture, thoracotomy, and drainage or suture of the lung at the point of rupture may be resorted to. Cellular emphysema, if caused by pneumothorax, may be relieved by multiple incisions in the soft tissues. Friedrich considers at length the physiology of operations on the lung with minus pressure, as performed in the Sauerbruch cabinet, and describes several new instruments, which are of material assistance in the performance of these operations. He has found it possible under the minus pressure to inspect large portions of the lung, without the danger of pneumothorax, and without having to resort to fixation of the lung. With improvement in the technique, with greater skill in diagnosis, and with more attention to asepsis, Friedrich is sanguine enough to believe that the time may come when an exploratory thoracotomy will present no more dangers or difficulties than an exploratory laparotomy.

Empyema. The results of the operative treatment of empyema leave much to be desired. The protracted period of convalescence, the deformities of the thoracic wall and spine, and the crippling of the lung itself are sufficient evidences that the results are yet far from ideal. Better results may be obtained according to Mann[3] if cases are recognized earlier and proper measures are adopted to promote expansion of the lung. In encysted empyema the incision should be made directly over the pus collection, and in general empyema near the midaxillary line at the base of the chest. If the adhesions are so placed as to interfere with lung expansion they should be broken up. Irrigation of the

[1] Münch med. Woch., 1906, Nr. 3. [2] Rev. de Chir., May, 1907.
[3] Surgery, Gynecology, and Obstetrics, September, 1907.

cavity is not advisable, inasmuch as it may retard the healing process, and has on certain occasions resulted fatally. Aspiration may be resorted to as a preliminary measure to relieve pressure and to lessen shock, or, as in double empyema, it may be performed, after one side has been operated upon, upon the opposite side, as preliminary to the latter operation. It is sometimes resorted to as a palliative treatment in cases of advanced tuberculosis and in cases of empyema following pneumonia, before the stage of resolution. To promote expansion of the lung, positive pressure inside the lung, or negative pressure in the thorax outside the lung, will be necessary, taking for granted that the adhesions have already been divided. Of these two measures, negative pressure within the thorax is the most efficacious, though not often taken advantage of by the surgeon. If the dressings are voluminous and firmly applied they will act as a valve. When the air is inspired into the lung, some air or pus will be expressed out of the drainage opening, and thus secure the intrathoracic vacuum. When the lung is compressed and bound down, more radical measures will be required, and of these the use of the air-pump has proved most satisfactory.

Lloyd[1] takes exception to the statement that with an opening larger than the diameter of the main bronchus the atmospheric pressure from without would be sufficient to keep the lung in a state of collapse. He makes it a practice to have the anesthetic discontinued before opening the pleura. The pleural cavity is explored with the finger, adhesions separated, and masses of thick lymph removed. If the adhesions are too firm to be divided with the finger he separates them with a curved periosteotome. This irritation of the pleura encourages the patient to cough, and with each forced expiration expansion of the lung takes place. If the adhesions have been freely broken up the lung will entirely fill the pleural cavity. He has employed this method in 225 cases, with a mortality of 20 per cent., and 43 per cent. of recoveries and 25 per cent. of cases improved.

Although the Schede operation is a very radical and serious procedure, it is indicated in a certain number of cases. There are many instances, however, in which, owing to the toxic condition of the patient and the likelihood of serious hemorrhage, the operation would be contra-indicated. The dangers of this operation are minimized, according to Bayer,[2] if the ribs are resected through a vertical incision made about one and one-half inches posterior to the anterior axillary line, and extending from the third to the ninth or tenth ribs. Through this incision a rapid exposure may be obtained, the important muscles and vessels avoided, and consequently less hemorrhage. If it is necessary to resect the second rib, the latter may be exposed by retracting the pectoral muscle and elevating the arm. The ribs are resected at a point near their angle to the

[1] Annals of Surgery, March, 1907.

[2] Zent. f. Chir., 1907, Nr. 1.

costal cartilage. If necessary to cause obliteration of the pleural cavity, the costal pleura should be either incised or resected. This operation Bayer believes causes less disfigurement than the Schede operation, is attended with less hemorrhage, and less mutilation of the musculocutaneous structures of the thoracic wall.

BILATERAL EMPYEMA may be due to a variety of affections, including actinomycosis, tuberculosis, puerperal infections, and certain pulmonary diseases, especially pneumonia. It is seen most commonly in the young, 75 per cent. occurring between the first and twelfth year, and somewhat more frequently in the male sex. According to Hellin's[1] description of the clinical course, there is a fall of temperature between the pneumonic and the pleural complications; this period in turn is followed by a marked febrile reaction. When complicating pneumonia the mortality is about 50 per cent.; there is a bilateral consolidation in about 28.5 per cent. of cases.

There seems to be a tendency for the empyema to become encapsulated, and this accounts for the failure of attempts at paracentesis. In this variety the pus not uncommonly escapes through a bronchus. A few instances are recorded in which repeated aspiration was attended with success. The success of these few cases should not tempt one to abandon rib resection. It has been proved from numerous observations that bilateral resection of the ribs is not necessarily fatal. It is important, however, to observe one precaution, namely, to make the pleural opening small in order that there may not be too sudden a change in the intrathoracic pressure.

EMPYEMA IN CHILDREN. A study of the etiology, pathology, and diagnosis of empyema in children, and especially the surgical aspect of the subject is one which affords much interest to the surgeon. Jopson[2] reports the results of 41 operative cases in which the age ranged from ten months to thirteen years, one-half of the cases being under four years and nearly two-thirds under six years of age. In a large majority there was a history of pneumonia preceding the empyema, usually the croupous type. In some cases the pneumonia had not resolved itself at the time of the operation, in others it preceded the operation by days, weeks, and even months. When present at the time of operation, pneumonia may be a formidable complication, or it may be relighted later in a lung already crippled and lead to a fatal termination. When a considerable period elapses between the onset of the pneumonia and the detection of pus in the pleural cavity, one can assume usually that the collection of pus has been present for a correspondingly long period, and that the lung is probably bound by more or less firm adhesions. The tardy convalescence, repeated operations, permanent

[1] Arch. f. klin. Chir., Band lxxxii, Heft 3.

[2] University of Pennsylvania Medical Bulletin, December, 1906.

crippling of the lung, and secondary deformities of the chest and spine are due to the failure either to detect the empyema or to resort to operative treatment in its early stages.

At the time of operation many of the above cases were desperately ill with pneumonia, a fact noted especially in the very young children where the mortality is highest. The more favorable had moderate fever, were somewhat anemic, had lost some weight, but had recovered from the initial illness and were not yet cachectic and exhausted by long-continued septic absorption.

The neglected cases were always much emaciated, very anemic, quite feeble, and in one case practically moribund at the time of operation.

Jopson is of the opinion that aspiration has no place as a curative measure in the treatment of empyema; resection of the ribs has many advantages; thus it is more favorable for exploration of the pleura, which is of prime importance in encysted collections, and permits of the evacuation of the masses of lymph which are frequently present, and which, if not removed at the time of operation, often clog the drainage tubes, or undergo slow decomposition, and furnish a good culture medium for infecting organisms. Close apposition of the ribs interferes with the use of large drainage tubes. Furthermore, the excision of a portion of the rib takes little more time than intercostal incision. In very sick children with large collections, preliminary aspiration, twenty-four hours before operation, is recommended.

The common postoperative complications were pneumonia, persistent or reawakened gastro-enteritis, and a condition resembling marasmus, but really a form of sepsis. Tuberculosis was not a common complication in this series of cases. The operative mortality was 19.5 per cent., most of the fatal cases occurring in very young children of two years or under. The causes of death were exhaustion, pneumonia, and sepsis. In five acute cases it was necessary to perform secondary operations, most of these having been neglected cases. In the secondary cases the Estlander operation was performed.

Pulmonary Complications following Narcosis. The pulmonary complications or sequelæ following narcosis occur sufficiently frequently to affect the mortality rate, and this is especially true after operations in the abdominal cavity. Many of these cases might have been avoided had proper precautionary methods been adopted and none but skilled anesthetists employed. The complications most commonly met with may be seen in the following table prepared by Wolfe.[1]

[1] Deutsche Zeit. f. Chir., Band lxxxviii, Heft 1 to 3.

TABLE V.

Lung diseases.	Ether (1806 operations).	Ether and chloroform (744 operations).	Chloroform (532 operations).	Total (3082 operations.)
	Per cent.	Per cent.	Per cent.	Per cent.
Bronchitis	47=2.6	36=4.6	9=1.7	92=0.3
Bronchopneumonia	15=0.83	19=2.4	7=1.3	41=1.33
Croupous pneumonia	10=0.55	2=0.27	3=0.57	15=0.48
Hypostatic pneumonia	4=0.22	....	1=0.18	5=0.16
Embolic pneumonia	3=0.16	1=0.14	1=0.18	5=0.16
Embolic infection	3=0.16	5=0.67	2=0.37	10=0.32
Emboli	4=0.22	2=0.27	....	6=0.2
Abscess	2=0.11	1=0.14	....	3=0.1
Gangrene	1=0.055	1=0.14	....	2=0.063
Tuberculosis	3=0.16	3=0.4	1=0.17	7=0.23
Pleuritis	4=0.22	2=0.27	....	6=0.2
Total	96=5.3	72=9.8	24=4.5	192=6.23

The toxic action of ether, chloroform, or their mixture has a deleterious effect on the lung. Ether causes a hypersecretion of the bronchial and tracheal mucosa, the secretion having the character of an inflammatory exudate, and, therefore, may readily become purulent. In the lung itself, anesthetics cause hyperemia, edema, and multiple foci of hemorrhage, these lesions being most marked in the dependent portions of the lung. The small bronchioles become occluded by epithelial desquamation, and cause collapse of the air vesicles. Edema and hemorrhage may be due to dilatation of the vessels caused by the action of the anesthetic. It has been shown by Lichtenberg that by blocking the bronchioles chloroform causes atelectasis of the lung. We know from animal experimentation that the normal bactericidal property of the lung is reduced by inhalation of various anesthetics. Many observers regard the aspiration of mucus as an important factor in the production of pulmonary complications after operations. Blood, pus, vomitus, and mouth secretions may be aspirated and cause a broncho- or lobar pneumonia, gangrene, or abscess. Aspiration of the stomach contents is not so common as the inhalation of oral secretions. It is well known that during narcosis there is a hypersecretion of the glands of the mouth, either central in origin or due to local paralysis. This secretion, containing many bacteria from the mouth and nasopharynx, is especially liable to be aspirated because of the paralysis of the muscles controlling the larynx and the loss of sensibility of these parts. The aspirated material is retained and not expectorated after the operation because of the pain that would be caused by coughing, because of the weak condition of the patient, of the prone position, and mental dulness.

It is well known that diseases of the respiratory apparatus predispose to postoperative complications. Henle's figures show 16.6 per cent. of pneumonia under these conditions, with a mortality of 8.3 per cent.,

whereas in laparotomies performed in patients with sound lungs only 6.9 per cent. were so affected, and the mortality was 3 per cent.

Other predisposing factors are a concentrated ether vapor, that is, one with but little admixture of air, exposure of the patient to cold during operation, the tendency toward congestion of the lungs due to the long-continued prone position, and embolism. It is a curious fact that more lung complications follow the use of local anesthesia (Schleich) in laparotomies than occur after the use of chloroform; this would seem to prove that the irritating effect of the anesthetic is not so important a factor.

The author has carefully analyzed 3248 operations, and found pulmonary complications in 5.3 per cent. following the use of ether. The percentage is much higher (11.3 per cent.) if the abdominal operations alone are considered. Following the use of mixtures of chloroform and ether the percentage was 9.8 per cent., and after chloroform 4.5 per cent. Especially low was the percentage (1.9) in operations either upon or near the respiratory tract.

Surgical Treatment of Emphysema. The primary cause of emphysema is generally conceded to be certain alterations of structure in the lung itself; the defect in the thorax is a secondary lesion, induced by the increase of pulmonary volume. Freund over fifty years ago combated this view, and attributed certain pulmonary diseases, notably tuberculosis and emphysema, to a congenital and developmental anomaly of the costal cartilages. The structure of the thorax is so altered as to favor the development of these diseases. The cartilages are in a state of fibrillation and cystic, and by the deposition of lime salts somewhat increased in size. The process is limited at first, affecting the second and third costal cartilages; it may remain localized or extend gradually over the entire thorax. As a result of these cartilaginous lesions the ribs and sternum are gradually forced out; the lessened elasticity of the thorax favors the formation of the barrel-shaped rigid thorax characteristic of emphysema. According to Freund's views the treatment of emphysema should consist in a resection of a portion of the thorax wall in order to restore its normal elastic condition.

To the operative cases already reported, Passler and Seidel[1] add another. The patient, a man, aged fifty years, had suffered for five years, and was relieved by resection of the first five cartilages. The operation is without danger or difficulty, if care be taken not to injure the pleura. The cartilages may be divided with a Gigli saw. There is practically no possibility of regeneration. If the first rib is involved and interferes with the general elasticity of the thorax it may be advisable to divide it and thus ensure a freer respiratory excursion.

Following this operation the barrel shape of the chest disappears and becomes flat, and the side operated upon moves freely on respiration;

[1] Münchener med. Woch., September 17, 1907.

expansion increases 2 to 5 cm. and the capacity of the lung 700 cm. (from 2000 cm. to 2700 cm.). Mohr's patient[1] required a second operation for the relief of dyspnea and cough, a more extensive resection following than in the first instance. The result obtained was remarkable: there was not only immediate relief of but no tendency toward a return of the pulmonary symptoms.

Actinomycosis. While numerous contributions have been made to the subject of pulmonary actinomycosis, comparatively few instances have been recorded in which the patients recovered; Kerewski[2] was able to find only six cases. When involving the lung the disease may be regarded as hopeless, if treated by conservative measures; if diagnosticated early before metastasis has occurred the diseased tissue may be completely removed and the patient recover. There may be said to be three varieties: one beginning primarily in the lung, another extending to the lung from neighboring organs, and a third of hematogenous origin. The prospects of recovery are limited to the first variety. The process appears rarely as a superficial catarrh of the bronchi, more usually as a bronchopneumonia. The wall of the bronchus ulcerates, the lung becomes infiltrated, and finally the process extends to the pleural cavity, there producing a dense fibrous reaction. As the lung tissue ulcerates or contracts the pleuræ become adherent, or at times the pleural cavity becomes filled with an effusion. The disease may then extend in various directions, involving the ribs and the contents of both the thoracic and abdominal cavities. In many cases this widespread involvement can be traced to a process which in the early stages was well localized in the lung and amenable to surgical measures. In its early stages the disease is difficult to recognize, because the symptoms are not pronounced and the characteristic fungus is rarely found in the bronchial secretions. In the primary stage blood-stained sputa, in which occasionally the ray fungus is found, would of course be more than suggestive. In the second stage the extension of the process to the thorax is accompanied by pain and by symptoms of an exudative or adhesive pleurisy, with contraction of the chest wall. Sooner or later the ribs and muscles become involved in the inflammatory process, which, when presenting on the surface, constitutes one of the most important diagnostic signs.

From an operative standpoint the lesion should be regarded as malignant and not as inflammatory. It is necessary to follow up every fistulous tract, for even when the disease seems limited, communications will be found between the lung and the thoracic wall. All diseased tissue should be removed, ribs resected; even the pericardium and large sections of the lung have been excised. Hemorrhage which is not excessive because of the large amount of fibrous tissue can readily be controlled by the cautery. The wound should not be closed, and, even

[1] Berliner klin. Woch., July 8, 1907.

[2] Arch. f. klin. Chir., Band lxxxiv, Heft 2.

though very large, should be allowed to remain open in order that the secretion can be examined daily for granules, the presence of which would call for further operative interference.

Pleural Fistula. This has been defined as a direct communication of the lung parenchyma or of a bronchus with the external air through the chest wall. As the pleural cavity is involved, the term is not applicable to a pneumothorax which has ruptured externally, nor does it include fistulæ existing between the lung or bronchus and the aorta, esophagus, and stomach. Of the two varieties, the complete and the incomplete, the latter includes those cases in which the fistulous tract extends from the lung to a subcutaneous abscess on the chest wall, requiring only perforation of the skin to convert it into the complete form.

Parker,[1] reviewing the literature on the subject, claims that the fistula is but an incident in a complicated pathological process, and that in order to appreciate its significance it is necessary to study it in connection with the lesion with which it occurs. Fistula may arise by perforation, outward, of a diseased process in the lung, usually an abscess; or by extension, inward, of a suppurating focus in the chest wall. A direct fistula may be established intentionally for the purpose of draining a bronchiectasis or a lung abscess.

The diagnosis is readily made by the physical findings. When in the course of a suppurative lesion in the lung or thorax the stage of incomplete fistula has been reached, our attention is first called to the event by the appearance of subcutaneous emphysema or the presence of an abscess containing gas. The tumor, most commonly situated between the second and third costal cartilages, is recognized by its physical characteristics: fluctuation, elasticity, impulse on coughing, tympany over the upper part, succussion sounds, and gurgling. A constant symptom of pleural fistula is the discharge of secretion mixed with air. The amount depends on conditions present in the fistula. From a short, direct fistula lined with mucous membrane there will be a minimum secretion, whereas the discharge is profuse from a long, tortuous fistula lined with granulations, or from one which communicates with an abscess. There is no tendency for the fistula to heal spontaneously; the fistula is kept open by the persistence of the lesion. At the site of a pleural fistula the lung is immobilized by induration and by its adherence to the chest wall.

The simplest method of effecting a cure is the use of the actual cautery, but this is applicable only to recent cases, not communicating with a cavity and without much induration. In long-standing cases a more radical operation will be required. To drain an abscess cavity it may be necessary to resect one or more ribs. To mobilize the lung decorti-

[1] Surgery, Gynecology, and Obstetrics, September, 1907.

cation of the visceral pleura may be resorted to. In addition it may be necessary to remove the lining membrane of the abscess cavity, otherwise the cavity cannot be obliterated. It is important in practising decortication to leave a strip of thickened pleura on either side of the fistula, into which sutures may be introduced to close the fistula.

Resection of the Chest Wall. It is generally admitted that Sauerbruch's or Bauer's apparatus may prevent the dangers of pneumothorax. In many instances, however, the surgeon has not at his command this ingenious apparatus. Rehn[1] reports his experience in three cases to show what can be accomplished without the pneumatic cabinet even when the pleural cavity is opened. To prevent complete collapse of the lung a traction stitch is inserted fairly deeply into the lung and pleura before opening the pleural cavity. The incision is then made into the pleuræ and the lung seized with a moist compress and drawn out through the wound. It is important to handle the lung as gently as possible, to thoroughly control hemorrhage, and to remove all blood from the pleural cavity when the operation is completed. The lung is then sutured to the thorax, so that it preserves its proper relation to the thoracic wall. As drainage is absolutely contra-indicated the wound should be completely closed; for Rehn considers infection more likely to occur with drainage than after complete closure of the wound. In his first case the author removed the third, fourth, fifth, and sixth ribs with the adjacent pleura, in a case of recurrent mammary carcinoma, the ribs being resected from the sternum to the axillary line. The lung was then sutured to the ribs and soft parts, and the skin sutured over the lung. The patient's health was excellent for one year, when internal metastasis developed and death followed two and one-half years after the operation.

The second patient had a large chondrosarcoma removed from the fourth and fifth ribs, the lung not being involved. Recurrence took place requiring a more radical resection, including a portion of the lung. The latter operation, however, was in turn followed by a rapid and more extensive recurrence. The third case required an excision of the second and third ribs for a sarcoma; the wound healed in ten days, and there was no recurrence nineteen months after operation.

The above cases illustrate what may be accomplished without a negative pressure cabinet in cases of emergency. The following case was a resection of the chest wall under negative pressure. The operation was performed by Hacker[2] for carcinoma of the breast which had extended to and infiltrated the chest walls. After the affected lymphatic nodes were removed, the fourth and fifth ribs, the corresponding intercostal muscles, and parietal pleura were excised, and the defect closed in by the soft parts. Healing ensued, and in two weeks the patient was able

[1] Arch. f. klin. Chir., Band lxxxi, Heft 1. [2] Zent. f. Chir., 1907, Nr. 37.

to leave the hospital. The principal danger of these operations is the pneumothorax with subsequent infection. The happy outcome in this case may be attributed to the use of the pneumatic chamber.

Chylothorax. Chylothorax is most frequently the result of traumatism, new-growths within the duct, or the pressure of tumors or tuberculous lymph nodes from without. The chyle either escapes because the wall of the thoracic duct is ruptured, or its vitality so impaired that the fluid escapes as a transudation. The disease occurs fairly frequently in children, Sherman's case being four and one-half years of age and Lotheissen's[1] eight weeks old. In the latter's case there was no demonstrable cause; it appeared soon after birth, and later involved the abdominal cavity. Paracentesis thoracis was practised three times, and the patient gradually improved. In the former case there were no symptoms until the fourth week after the injury; this case might be quoted in support of the view that chyle is not always poured out immediately after traumatism. The symptoms were those of a pleural effusion, and were relieved by the aspiration of 28 ounces of fluid. Two aspirations were subsequently performed, five and eleven days, respectively, after the first, 20 ounces being removed on the second occasion and 40 ounces on the third. Following the last attempt there was no recurrence of the effusion, and the boy has remained well for eleven months.

In Milton's[2] case 15 pints were withdrawn. In this case the effusion was attributed to tuberculosis, as the patient had a lesion of both apices. The effusion had been present at least two years, but as soon as it was withdrawn convalescence was rapid. The case is of interest because of the unusually large amount of effusion, the largest ever recorded, and because of the duration of the lesion before it was recognized and properly treated.

In cases due to neoplasms the prognosis is, of course, grave. Dock[3] observed a case of lymphocytoma which caused pressure on the duct by a mass which was continuous with the mesenteric nodes. Surgical therapy is applicable to these cases only in which the duct has been ruptured. This complication has been considered with its treatment in the section devoted to Surgery of the Neck.

Dermoid Cysts of the Mediastinum. A comprehensive review of this rather uncommon affection was made several years ago by Morris,[4] who at that time had collected fifty-seven cases. Since then but one other case has been recorded in literature, the one observed by Griffin.[5]

A boy, aged fifteen years, developed, as primary symptoms, pain in the chest, dyspnea, huskiness of the voice, and subsequently a swelling

[1] Wiener klin. Rundschau, 1907, Nrs. 1 und 2.
[2] British Medical Journal, November 2, 1907.
[3] American Journal of the Medical Sciences, November, 1907.
[4] PROGRESSIVE MEDICINE, March, 1906.
[5] Boston Medical and Surgical Journal, January 3, 1907.

on the right side of the chest. An examination revealed a lesion extending under the sternum, diagnosticated as a pleural effusion. At an exploratory puncture two ounces of a thick, glairy, dark green fluid were withdrawn, and upon opening the pleural cavity a dense tumor mass was seen. The possibility of a dermoid was not thought of until a few hairs were found in the discharge; a more thorough search revealed the true nature of the growth. The patient gradually grew worse, losing weight, and developing a troublesome cough. A second operation was performed, the pleural cavity was opened by resecting the third to the sixth ribs. An opening was made in the cyst which was found to extend from the second rib to the diaphragm and across the median line beneath the sternum, practically filling the right half of the thorax and part of the left. It was filled with irregular grape-like masses, to which grew sparse, long hairs. Two large masses and several smaller ones were removed without any serious hemorrhage. The patient lived only two and one-half months; the tumor rapidly recurred, and caused a marked bulging of the chest. The pathological diagnosis was a teratodermoid; while embryonal in type and very cellular, with evidences of rapid proliferation, the growth was probably not very malignant and not likely to have been followed by metastasis.

Bronchoscopy. The advantages of being able to extract foreign bodies from the air passages without the added risk of an operation is apparent; that this valuable addition to our surgical armamentarium is commanding more widespread recognition is manifest from the numerous contributions to literature. The technique is in most instances easy, and seldom are there complications. Lange[1] reports a case of pneumonia following the extraction of a peanut from the right bronchus, but in this case the pneumonia was in all probability caused by the irritation of the foreign body rather than by the passage of the bronchoscope. Occasionally the swelling of the mucous membrane prevents a good view of the foreign body. To meet this complication Lehr[2] recommends the use of adrenalin chloride. As a rule, upper bronchoscopy is preferable, because of the danger of a tracheotomy, although inferior bronchoscopy may be given preference when the body is large, when there is danger of it dropping back or of injuring the larynx on withdrawal. Gottstein[3] also emphasizes the advantages of upper bronchoscopy, and resorts to the inferior only when the less dangerous method fails. He gives the histories of 15 cases, in 4 of which upper bronchoscopy was used exclusively. One case was successful, in another the attempt failed, and in 2 the result was negative. In 6 instances upper bronchoscopy had to be followed by tracheotomy. In 10 of the 15 cases the foreign body was seen, and extracted in 8. Only 1 case terminated

[1] Cleveland Medical Journal, March, 1907.
[2] Berliner klin. Woch., November, 1906.
[3] Mitt. aus den Grenzgeb. der Med. und Chir., 1907, Sup. 3.

fatally, but here the foreign body had been in the lung three years. The author collected 137 cases; in 114 of these the diagnosis was confirmed by the bronchoscope, and in 115 (84 per cent.) the foreign bodies were successfully extracted.

Krausch[1] reports 6 cases, in only 2 of which the upper method was used. He prefers general narcosis in children under six, and in the young condemns upper bronchoscopy. Jackson, however, has shown that the upper method can be applied safely to young children, as in 2 children, one of eight and one of twelve months of age, without the added risk of tracheotomy. Before the Laryngological Section of the College of Physicians, Philadelphia, he cited a number of conditions in which bronchoscopy had been used with great success, and laid particular stress on the use of the instrument as an aid to diagnosis. He has been able, among other things, to diagnosticate tracheal ulcerations of syphilitic origin, and predicts a brilliant future for bronchoscopy in pulmonary surgery and diagnosis. Schrötter[2] has shown the value of bronchoscopy in the diagnosis of certain pulmonary diseases, by recognizing a primary carcinoma of the lung, from which a section of tissue was removed for microscopic examination.

Surgery of the Esophagus. Surgical intervention for lesions of the thoracic portion of the esophagus is still in its infancy; the results as yet are not brilliant, although there is reason to believe that in the future operations in this region will be undertaken without hesitation. Wendel[3] operated upon 2 cases of *carcinoma* of the cardia, using Brauer's apparatus. In the first instance the thorax was opened by an incision 16 cm. long in the sixth intercostal space. As the tumor had extended to the lung and diaphragm the condition was hopeless, and the operation could be regarded merely as of an exploratory nature. In the second case a large tumor was removed from the stomach and lower portion of the esophagus. The vagi were easily retracted and the thoracic portion of the tumor well isolated. After removing a portion of the lesser curve of the stomach and the area of the esophagus which was involved a lateral anastomosis was effected between the esophagus and stomach, and the diaphragm sutured to the stomach. Unfortunately the patient died of a postoperative hemorrhage on the following day, but the postmortem examination showed all the sutures intact.

For those cases of *esophageal stricture* which will not respond to dilatation Rikitzky[4] recommends a plastic operation. In the case he reports all attempts to dilate from above or by retrograde dilatation from the stomach had proved ineffectual. The esophagus was then exposed, opened above and below the stricture, and the cicatrix excised. The resulting defect was repaired with an inverted skin flap, the skin

[1] Med. Klin., December 23, 1906.
[2] Wiener klin. Woch., 1906, Nr. 33.
[3] Zent. f. Chir., 1907, Nr. 31.
[4] Archiv f. klin. Chir., Band lxxxii, Heft 2.

surface being turned inward. Previously a tube had been introduced into the esophagus and was retained in place by strings brought out through the nose above and the gastric fistula below. Later the flap was divided from its pedicle, the wound healed, and the gastric fistula was allowed to close. The patient was able to swallow all kinds of food, and was perfectly well when discharged. The rapid repair of the esophageal wound may be attributed to the preliminary gastrostomy; this operation would seem to be indicated as a preliminary measure in all operations in which portions of the esophagus are to be excised.

Retrograde dilatation should be tried invariably in cases of impermeable stricture before resorting to more serious measures. By such means Viannay and Bourret[1] were able to find the passage through a stricture in a child, aged six years, 27 cm. from the incisor teeth.

Maffei[2] adopted more radical measures. The strictures in each of his two cases were directly above the cardia. A thoracotomy was performed, the affected portion of the esophagus exposed, and numerous adhesions between it and the pleura found. After the latter were freed a sound could be passed very easily into the stomach. The convalescence in the first case was complicated by an empyema; in the second case the wound had healed by the twelfth day. Both cases were fed by the mouth from the time of operation and the stomach fistulæ closed spontaneously.

In previous numbers of PROGRESSIVE MEDICINE the origin and formation of *esophageal diverticula* have been thoroughly discussed. When the diverticulum is small it may intercept the food which is first ingested, so that the food taken later, when the pouch is filled, may pass unobstructed into the stomach. As the pouch becomes more and more distended, and consequently heavier, it pulls on the pharynx, presses on the esophagus, and acts as a valve. The diagnosis can be made by the passage of bougies or by the *x*-rays. Pollard[3] excised a diverticulum with a capacity of 9 ounces. The case was a typical instance of the most common form of diverticulum, that which gives rise to the most distressing symptoms and that for which surgical interference is most commonly required. The diverticulum formed in the middle line, posteriorly, at the junction of the pharynx with the esophagus. It had been present eleven years. An incision was made along the anterior border of the sternocleidomastoid muscle, from the sternum to the level of the hyoid bone. The pouch was found behind the esophagus and apparently in continuity with the pharynx, but was easily freed, brought up into the wound, and removed. Reisenger[4] excised a diverticulum of twelve years' duration. A preliminary gastrostomy was performed, and three weeks later the thorax was opened and the esoph-

[1] Rev. mens. des malad. de l'enfance, March, 1907.
[2] Ann. de la soc. Belge de chir., 1906, No. 8.
[3] British Medical Journal, May 4, 1907.
[4] Zent. f. Chir., 1907, Nr. 31.

agus exposed. The removal of the diverticulum had to be postponed, however, until a later period, on account of the patient's condition. At this time a portion of the esophagus, 15 cm. long and 3 cm. wide, was removed. After the operation the symptoms of dysphagia and oppression disappeared and the patient rapidly regained weight. Kuster[1] operated on a diverticulum, which apparently was caused by coughing in an attack of influenza; the question arose as to whether the diverticulum was due to a muscular paralysis which had been induced by the toxins of the influenza bacillus. The operation was preceded by the extirpation of a goitre, after which the sac was exposed and removed. Convalescence was delayed by the formation of a fistula, but the latter rapidly healed after resorting to the daily injections of iodine.

FOREIGN BODIES IN THE ESOPHAGUS. Foreign bodies may be impacted in the esophagus for long periods without causing great inconvenience, in many cases causing so few symptoms that the condition is not recognized. This is often due to the fact that the foreign body becomes coated with mucus, so that instruments inserted readily slip by. The presence and seat of a solid body should be readily detected by the *x*-rays. There are numerous instances of foreign bodies extracted by both operative and non-operative measures. Scannel[2] records a case of interest because of the time elapsing between the lodgement and the removal of the body, the comparative freedom from obstructive symptoms, and the absence of pain. A child, aged seven years, swallowed a sewing-machine shuttle, which remained in the esophagus seven weeks; subsequently there was difficulty in the ingestion of solid food, vomiting, and pain in the chest. The *x*-rays revealed the presence of the foreign body, and an attempt was made to extract it with the aid of the fleuroscope. This was unsuccessful, and the body was finally pushed into the stomach by a probang. Another instance is recorded by Davison[3] in which a bolus of food was lodged in the esophagus at a point constricted by a large goitre. The patient was unable to swallow, and, as instrumentation was impossible, an injection of apomorphine was given and the foreign body was ejected. These two examples illustrate what may be accomplished by simple procedures and by those unskilled in the use of the esophagoscope.

With the esophagoscope Stillman[4] successfully extracted a safety pin, with the point open, at a distance of 25 cm. from the incisor teeth. Occasionally the ulceration of a foreign body in the esophagus may produce a tracheal irritation, and the symptoms may be suggestive of a foreign body in the trachea and lead one to do an exploratory tracheotomy. These were the circumstances in the case reported by Koropowsky,[5] where the

[1] Archiv f. klin. Chir., Band lxxxiii, Heft 2.
[2] Boston Medical and Surgical Journal, December 7, 1906.
[3] British Medical Journal, 1907, No. 139.
[4] Ohio State Medical Journal, 1906, p. 236.
[5] Zent. f. Chir., 1907, Nr. 14.

foreign body was lodged directly opposite the cricoid cartilage. Irregular foreign bodies impacted in the lower portion of the esophagus can frequently be reached by means of a gastrotomy. Thus, Billot,[1] after the stomach had been opened, stretched the cardia with his finger and extracted a foreign body with forceps. Wiatt[2] thus summarizes the management of these cases. A foreign body should be removed at once to prevent impaction, ulceration, and its dangerous complications. Prolonged efforts at removal through the mouth are to be condemned, the esophagus, the thoracic vessels, or viscera may be lacerated, causing fatal hemorrhage or infection of the mediastinum or pleural cavities. All bodies of bone or metal should be located with the *x*-rays before attempting to remove them. Feeding through a stomach tube after esophagotomy is not practical in young children, so they must be fed per rectum until the wound in the esophagus is closed, to prevent the escape of the liquids into the neck during the act of swallowing.

Surgery of the Heart. The possibilities of the application of surgical therapy in lesions of the heart are just beginning to be realized, partly as a result of clinical evidence, more especially in cases of cardiac massage and closure of wounds of the heart, and partly as a result of the observations in animal experimentation. In the latter it has been found possible to produce experimental lesions of the cardiac valves, and Sweet[3] has shown that it is possible to clamp the vessels on either side of the heart, open an auricle for exploratory purposes, and close the wound in the same without losing the life of the subject. The impunity with which the heart may be handled, with which cavities may be opened, the valves explored, and the circulation entirely arrested during the exploratory procedures, is a revelation of the experimental and clinical laboratory. It remains to be seen to what practical purposes the results of our experimental observations may be applied. Up to the present time surgical therapy applied to the heart has been limited to the closure of wounds, to the cardiac massage in cases of syncope, and to the treatment of pericarditis. The conclusions to which we have gradually arrived are thus summed up by Harte:[4]

"The consensus of opinion among experimenters is that the heart after being exposed can be grasped with the hands or forceps and gently compressed with no appreciable effect on its action; that punctures with needle or knife produce only a temporary irregularity in the heart's action; that wounds produced during systole bleed more than those occurring during diastole; that wounds of the ventricle produced during systole are larger than those produced during diastole; that oblique wounds bleed more than perpendicular wounds; that wounds of the

[1] Arch. de méd. et. de pharm. milit., December, 1906.
[2] International Journal of Surgery, 1907, p. 11
[3] Laboratory of Experimental Surgery, University of Pennsylvania.
[4] Annals of Surgery, May, 1907.

right ventricle are more dangerous because of the thin, ventricular wall, and because the blood in the right heart coagulates more slowly; that wounds of the heart heal kindly, and that the cicatrix is complete in two weeks; that interrupted sutures are better than continuous ones; that the material enclosed in the grasp of the sutures causes atrophy, and is replaced by scar tissue; that superficial stitches are less liable to tear out than deeper ones; and that the stitches should be inserted and tied during diastole, because of the danger of tearing out during systole."

The best suture material is chromicized catgut; the stitches if left long after tying can be used as tractors, and enable the more accurate introduction of the subsequent stitches. In ventricle wounds the sutures should be inserted deeply to secure approximation. In wounds of the auricle through-and-through sutures are imperative, as well as several superficial ones, as bleeding sometimes takes place through the suture wound. If the line of suture involves the coronary artery, little harm is likely to result if the vessel is caught in the suture.

When the lung collapses the heart loses the effect of the support to which it had been accustomed; its action becomes at once more erratic. Harte succeeded in overcoming this difficulty by packing the large space with pads of gauze wet with saline solution.

Collapse of the lung has always been an annoying immediate complication of cardiac injuries, and often leads to serious results. Sauerbruch[1] endeavored to study the effect of the negative pressure chamber on this condition, and from his observations drew the following conclusions: "The use of the pneumatic cabinet in excluding the danger of pneumothorax makes the operation less difficult and of shorter duration. The ability to regulate the pressure diminishes the amount of bleeding from the heart and aids in the introduction of the sutures, because the wall of the heart is relaxed. The exclusion of pneumothorax protects the patient against the danger of infection which is so commonly associated with this complication."

It cannot be denied that a certain percentage of cases recover spontaneously, but the chances of recovery after injury to the heart are immeasurably better if the wound is sutured. Various methods have been used to control hemorrhage at the time of operation. A finger has been thrust into the wound; compression of and traction upon the heart have been tried. Rehn[2] suggests compression of the vena cava. As proved by animal experimentation this method is both efficient and harmless for a short period. Rehn believes in closing the pleura and draining the pericardial sac.

Franke[3] shows the chief danger in wounds of the heart to be oppression of the heart's action by collection of blood in the pericardial sac. For this complication aspiration, though not often resorted to, should

[1] Archiv f. klin. Chir., Nr. 83, Heft 2.
[2] Zent. f. Chir., 1907, Nr. 31.
[3] Deut. med. Woch., 1907, Nr. 9.

be tried, as it relieves the symptoms of pressure and may be followed by repair of the wound. It makes little difference whether an operation is to be performed or not, if pressure exists the blood should be removed Under local anesthesia the pericardial sac should be aspirated, the needle being introduced in the fifth intercostal space 2 to 3 cm. from the median line being sufficient.

Harte[1] reports a stab wound of the left auricle, one-half inch in length, from which a large amount of blood spurted. The wound was closed by two through-and-through catgut sutures, which had to be reinforced by a number of superficial ones. The wound in the pericardium was closed. Bronchopneumonia and empyema developed, from which the patient died twenty-four days later. Thiemann's[2] patient sustained a needle wound of the left ventricle 1 cm. in length and another of the right auricle 1.5 cm. in length. With one catgut suture for the first and four for the latter, hemorrhage was completely controlled. The pericardium was drained and the patient recovered. In Fourmestraux and Delille's[3] case the left ventricle and the left coronary artery were injured. The artery was ligated and three sutures introduced. While the wound was being closed the heart ceased beating, but resumed its action upon the application of massage. The patient died while the outer wound was being closed. An extensive hemorrhagic effusion following a bullet wound was evacuated by Zambilovici.[4] As soon as the effusion was removed the heart action became stronger, and the patient recovered after a slight pericarditis. A wound of entrance and one of exit in the left ventricle was closed by Fettig.[5] The first, 3 cm. long, was approximated by six catgut sutures, and the latter by two. Death resulted in twenty-four hours.

Rehn reports a case with an extensive wound of the right ventricle.[6] The wound was closed, but the patient died thirty-six hours after the operation. Merwein[7] records an unusual case of wound of the left auricle. Because of the position of the wound and the movement of the auricle, it was impossible to insert a suture. The opening was seized with forceps and closed with a ligature thrown around it and the pericardial sac drained. The patient recovered. Baudet[8] sutured a wound of the right ventricle one and a half hours after the injury was inflicted. The heart had almost ceased beating when the pericardium was opened; as soon as the sutures were inserted its activity was resumed. The pericardium was closed without drainage, and the patient recovered.

[1] Annals of Surgery, May, 1907.
[2] Arch. f. klin. Chir., Band lxxxiii, Heft 2.
[3] Bull. et. mém. Soc. anat., 1906, No. 4.
[4] Biersta de chir., December, 1906.
[5] Bruns' Beit. zur klin. Chir., Band lv, Heft 2.
[6] Zent. f. Chir., 1907, Nr. 31.
[7] Münch. med. Woch., 1907, Nr. 36.
[8] Revue de chir., February, 1907.

The symptoms in the case of Mandaire[1] were at least suggestive of a wound of the heart. A wound of the pericardium was found with a few drops of blood in its cavity, but none of the heart muscle. The pericardium and pleural cavities were drained, but the patient died in sixty-eight hours from symptoms of cardiac failure. As there was no wound in the heart the symptoms in this case may have been of reflex origin from the contusion of the heart muscle. Riche[2] records an unsuccessful attempt to suture a wound of the left ventricle. During the introduction of the suture the heart stopped beating, and in spite of artificial respiration and cardiac massage its action could not be restored.

The following table records the number of cases of heart suture reported during the past year; this brings the total number of the series, which was commenced in PROGRESSIVE MEDICINE, March, 1903, up to 126. The second table is a summary of the results obtained by operation.

TABLE VI.

Operator.	Location and size of heart wound.	Results.
119. Harte, Annals of Surg., May, 1907.	Left auricle, wound 1½ inches, through-and-through sutures.	Death in 24 days. Pneumonia and empyema.
120. Thiemann, Arch. klin. Chir., 83, Nr. 2.	Left ventricle, wound 1 cm., right auricle 1½ cm., 1 suture for first, and 4 to close second.	Recovery.
121. Fourmestraux, Bull. et mém. Soc. anat., 1906, No. 4.	Left ventricle and left coronary article. Ligation of artery and 3 sutures for wound.	Death during closure of wound in thorax.
122. Zambilovici, Biersta de chir., Dec., 1906.	.....	Recovery.
123. Fettig, Bruns' Beiträge, Nr. 55, Heft 2.	Left ventricle, 2 wounds by bullet.	Death in 24 hours.
124. Rehn, Zent. Chir., 1907, Nr. 31.	Right ventricle.	Death in 1½ days.
125. Merwein, Münch. med. Woch., 1907, Nr. 36.	Left auricle, ligation of wound. Drainage.	Recovery.
126. Baudet, Rev. de. chir., February, 1907.	Right ventricle, no drainage of pericardium.	Recovery.

[1] Revue de chirurgie, March, 1907.
[2] Ibid., August, 1907.

TABLE VII.

	Cases.	Died.	Recovered.	Mortality. Per cent.	Recovered. Per cent.
Right ventricle	44	30	14	70.0	30.0
Left ventricle	58	30	28	51.0	49.0
Right auricle	3	1	2	33.⅓	66.⅔
Left auricle	3	1	2	33.⅓	66.⅔
Left apex	6	3	3	50.0	50.0
Coronary artery	1	1	..	..	100.0
Septum	2	1	1	50.0	50.0
Seat not stated	8	5	3	62.5	37.5

	Cases.	Per cent.
Total number of cases	125	
Number of deaths	72	58
Number of recoveries	53	42

Surgery of the Pericardium. While the pericardium is involved in many conditions which affect the heart also, there are certain conditions where surgical therapy may be indicated for lesions of the pericardium alone. Gluck[1] reported a case of extensive tuberculosis of the sternum, in which he successfully removed the entire bone and ligated both internal mammary arteries. From the anterior mediastinum extensive tuberculous masses were removed, and in two places portions of the pericardium excised, exposing the heart. During this operation, performed in stages, the pleura was uninjured, because it had contracted as the result of the long-continued inflammatory process. The patient lived one and one-half years, and then died from pulmonary tuberculosis.

Puncture for pericardial effusions is best performed in the sixth intercostal space near the sternum. If attempted in the fourth or fifth interspaces, at a distance of 6 cm. from the sternal edge, the pleura or lung will be injured. Gluck prefers a more radical operation, a pericardotomy with subperiosteal resection of the ribs, because in cases of effusion the heart is floated toward the thoracic wall, and may thus be injured by the trocar. The effusion is most readily reached and drained by this procedure, and the operator has an opportunity to inspect the sac. The best point at which to open the pericardium is somewhat inside the outer margin of dulness, at the level of the fifth or sixth rib. At this site the heart and lung will escape injury. In two instances which the author reports the relief from the effects of the pericardial effusion following the operation was immediate. The reflex cough,

[1] Arch. f. klin. Chir., Nr. 3, Band lxxxv.

difficulty in swallowing, and congestion of the liver disappeared in one case permanently, in another only temporarily. Killian[1] obtained a most satisfactory result after draining the pericardium for a large effusion. He noted instant relief, for the patient was practically moribund until the fluid was evacuated. The more extensive operation proved necessary in Berard and Pehu's case;[2] preliminary puncture removed the effusion, which was tuberculous, but a rapid recurrence necessitated the establishment of drainage.

Cardiolysis. The indications for this operation and the technique originally devised by Bauer are now well known. Those who have practised cardiolysis for the relief of an adherent pericardium have endeavored to remove the periosteum of the ribs from both its anterior and posterior surfaces, because of the possibility of bone regeneration. The question is important because of the extreme difficulty in removing the posterior periosteum and the dangers of complications in this region. It has been shown by König[3] that it is almost impossible to remove the posterior periosteum without injury to the pleura, and that, as shown by his own case, the procedure is unnecessary. He removed portions of the fourth, fifth, and sixth ribs in a case of adherent pericardium, leaving a large defect. Relief was experienced almost immediately, for the heart's action improved steadily during the operation. For two and one-half years the patient was thoroughly comfortable, and then died of miliary tuberculosis. The autopsy disclosed an opening in the thorax wall which had not diminished in size from the time of operation. Evidences of regeneration of the ribs were slight, and consisted merely in a few irregular projections from the ends. While there is often more extensive regeneration, it is practically always seen in inflammatory processes, such as empyema, where sufficient irritation exists to cause proliferative changes. In cardiolysis the large area denuded excludes the chance of a mechanical irritation, and in the absence of acute inflammatory processes regeneration of the ribs is not to be feared. The posterior periosteum can be left undisturbed, therefore, and the operation hastened and simplified by removal of the ribs with the anterior periosteum. Blauel[4] corroborates König's statements, for he has observed three cases in which the same technique was employed. In each instance a satisfactory result was obtained. Wenckebech[5] operated upon a case in which the secondary effects of the pericardial lesion were most pronounced. The embarrassment of respiration and circulation was relieved as soon as the ribs were removed. The subsequent course of the case was equally satisfactory, the enlarged liver decreased, the

[1] Annals of Surgery, January, 1907, p. 130.
[2] Providence Medical Journal, January 12, 1907.
[3] Zent. f. Chir., 1907, Nr. 27.
[4] Ibid., Nr. 33.
[5] British Medical Journal, January 12, 1907.

amount of urine increased, and the anasarca gradually disappeared. It can be seen from these cases that cardiolysis may cure cases when not too far advanced; even in advanced cases it may afford much relief.

Massage of the Heart. Owing to the successful results obtained in a number of cases, cardiac massage, as a method of reëstablishing cardiac activity in cases of syncope, is gradually assuming a more conspicuous role. Most frequently it has been applied in cases of collapse during anesthesia, and, as might be expected, usually when chloroform was used. Thus, out of thirty instances of cardiac massage, in twenty-four chloroform was the anesthetic and presumably the cause for the cardiac depression. Green[1] has collected 40 cases of cardiac massage; 9 of these were entirely successful, 8 partially so, and 12 cases in which the circulation and respiration were restored, but ultimately terminated fatally. A critical review of the successful cases would seem to show that heart massage was more influential in some than in others. Up to the present it has been possible to restore the heart beat by massage when ordinary measures of resuscitation have failed, even when the massage has not been commenced until the heart beat had stopped for forty-five minutes, although final recovery never ensued when the interval has been longer than from seven to eight minutes. In many cases the adoption of massage for a period of from thirty seconds to five minutes has been sufficient to restore the heart beat, but it has sometimes been necessary to go on with it for fifteen minutes or even longer. Artificial respiration and its adjuncts must also be continuously applied; sometimes it is necessary, in order to reëstablish the respiratory act, to persevere with it long after the pulse has returned.

According to Green, cardiac massage should commend itself to the practical surgeon, and may be used under the following conditions: (1) Cases of primary arrest of the heart in a condition of acute dilatation from poisoning by an overdose of a powerful volatile drug, such as chloroform; (2) cases where the gradual accumulation of volatile poisons, such as chloroform, leads to a primary paralysis of the respiratory and vasomotor centres followed by stoppage of the heart; (3) cases of asphyxia; (4) cases of suspension of the functions of the vital centres from simple exhaustion or injury, and consequent stoppage of the heart.

Among the important instances of cardiac massage recently reported the cases of Gross and Sencert[2] may be mentioned. The first case collapsed under chloroform anesthesia, and cardiac massage was begun. This was ineffectual, because of an extensive suppurative exudate around the pericardium, death under such circumstances being inevitable. In the second case the patient had a carcinomatous stricture of the esophagus; cardiac action ceased during the operation. Massage was

[1] Lancet, December 22, 1906.

[2] Arch. prov. de chir., November 12, 1906.

begun by the subdiaphragmatic route; in two minutes a forcible beat was felt. The palliative gastrotomy for the esophageal condition was then completed. Both of Green's[1] cases died. In one case the heart beat and respiratory action were reëstablished and maintained for a period of twenty hours, but consciousness never returned. In the second case massage was instituted earlier (fifteen minutes). The patient, a child three years of age, was suffering from diphtheria. Within five minutes from the time massage was begun the heart resumed its action, but the results were only temporary, as the child died an hour and a half later.

[1] Loc. cit.

INFECTIOUS DISEASES, INCLUDING ACUTE RHEUMATISM AND CROUPOUS PNEUMONIA.

By ROBERT B. PREBLE, M.D.

The preparation of the article upon infectious diseases has been surrounded this year by an increase in the difficulties which have encompassed its preparation in former years. The amount of literature to be looked over has, if anything, been increased, and a much larger proportion than usual has been given up to the discussion of purely theoretical questions, the practical bearing of which is still too uncertain to warrant review in an article of this nature. Probably the best illustration of this is furnished by the articles upon the opsonic index. These have been very numerous in American and English literature, but few and far between in the German and French. The only one of the diseases usually considered in this chapter concerning which much has been written from the standpoint of the opsonic index is tuberculosis, and most of the articles so far have been upon surgical tuberculosis. The impression one gets from these articles is that the results are not such as to warrant the great enthusiasm shown by some. It would seem, for the present at least, certain that the method is surrounded by such great technical difficulties and consumes so much time in its application that it is not available to the general practitioner.

New or increased light has been thrown upon many special features of certain of the infectious diseases, while, as has been pointed out in earlier articles, other common diseases have been almost entirely neglected. Among this latter group measles is again the most conspicuous example. The literature upon this disease is so scanty as to be practically non-existent. This is well shown by the fact that in the first eight numbers of the *Index Medicus* for 1907 there are listed but six articles which, from their titles, appear worth looking at. No one of these, however, warrants any comment, for they are either reviews of the literature of some old and well-known clinical feature of this disease or are reports of single cases which presented an unusual number of complications.

Much the same statement has been made each year for several years in regard to the literature of measles, but each year sees a decrease in the amount of attention given to this disease, which, according to the United States census for 1900, caused the death of 12,866. If to this

obvious mortality one adds the deaths due to pulmonary sequelæ, measles cannot be properly regarded as an unimportant disease.

The literature upon diphtheria has decreased greatly in the last few years, because so many of the most important problems in connection with it may be looked upon as definitely settled. In one way we have not made as much progress as we might have expected. The number of deaths has decreased very greatly, but the number of cases still remains too high. This is, no doubt, due to lax quarantine, cases being allowed to return to their usual activities before the bacilli have disappeared from the upper air passages. Reference will be made to, and details quoted of, work showing the persistence of the bacilli in the throat, and the obvious danger which such individuals are to others.

Another disease which work of late years has shown to be spread by people who, year after year, carry about and excrete the causal bacterium, is typhoid fever. There have been noted for many years epidemics of typhoid fever, which were difficult to explain upon the basis of any known fact. Reference has already been made in earlier articles to the chronic typhoid bacillus carrier, but this year the matter has received an increased amount of attention. One who is interested in this work, or who enjoys a good detective story, cannot do better than read in detail the work which Soper did upon the typhoid epidemic in Oyster Bay in 1906.

The etiology of scarlet fever is still a subject of study, but as yet no reasonable candidate for the position of active cause has been discovered. Additional work brings increasing evidence in favor of the idea that the streptococcus is not the actual cause of the disease, but merely a secondary infecting agent, which probably gives to the disease its vicious character.

Last year and the year before the French authors discussed vigorously the advantages of a salt-free diet over the standard milk diet as a protection against scarlatinal nephritis, but during the current year nothing upon the subject has been noted.

The number of articles upon pneumonia has been much decreased, possibly because there have been fewer articles upon so-called specific methods of treatment. This is encouraging, for it indicates a wider diffusion of a proper appreciation of this disease. Confidence in the open-air treatment increases as experience with it enlarges, and it is becoming more and more certain that the same lines of treatment are equally applicable to other diseases, typhoid fever, for example.

Bubonic Plague is at present a disease about which most of us have no great direct interest, but that it may become so is evident from the large numbers of cases reported in places not so remote from our shores.

The first number of the 1907 volume of the *Journal of Tropical Medicine* contains a brief review of the distribution of the plague throughout the world. During the year 1906 there were nearly 400,000 deaths from

this disease in India alone. Startling as is this number, it is a marked improvement on the previous year's record, namely, over 1,000,000 deaths.

During the spring and summer in Hong Kong there were 834 deaths, and up to August over 2000 deaths in Formosa. In Australia only a few cases were reported. Europe reported no cases, except a few in seaport towns. North America also was free, but there were over 200 cases in Rio de Janeiro.

There has been gradually accumulating a very considerable amount of evidence in favor of the theory that there is a relation between the epizoötic disease of rats and the plague in man. It has been shown that flies, ants, and bugs may contain plague bacilli in their alimentary tract, but their power of transmitting the disease seems unproved. With fleas, the possibility of transmitting plague is more definite. The common rat flea will carry the disease from a plague-infected rat to a healthy rat confined in close proximity, but in such a way as to protect it from all other chances of contagion. Fleas fed on diseased rats, and then collected and allowed to bite healthy rats, excite in them the plague. Two monkeys were exposed in a plague-infected place, one in a flea-proof cage and the other not. The former monkey escaped, but the latter became infected.

It has been definitely proved that neither by the soil nor by aërial infection can plague be conveyed from one animal to another.

The rat flea can carry the disease, but it is not yet known whether this is the only way the disease is carried or not.

It is interesting to note how facts in regard to one disease have a bearing upon other diseases. After the demonstration of the relation of the mosquito to the causation of malaria, it became easy to show the important bearing which this fact had upon the diffusion of yellow fever.

Years ago Smith showed the relation of a tick to the spread of the Texas fever of cattle, and that the young of the tick also had this power. Now, Koch has shown that relapsing fever is also spread by a tick and by its young.

In relation to the spread of the bubonic plague by fleas, it is interesting to note that Chantemesse claims to have discovered that *miliary fever* is carried to human beings by the fleas of field mice.

Cerebrospinal Fever. This disease continues to be a matter of great interest, for it is still epidemic in various parts of the world. Naturally, the number of articles upon the disease increases and decreases with the number of cases, and we find fewer articles in American literature; but in Scotland, where the cases have been becoming more numerous, the articles in the journals have multiplied rapidly.

The two most important practical questions concerning this disease, are, first, the mode of infection, and, second, the treatment of it. The large number of reports which have been made showing the meningo-

coccus in the upper air passage, and the close anatomical relation of these parts to the sites in the brain of most intense inflammation, has naturally led to the idea that the infection atrium is somewhere in the nasopharynx.

Jehle[1] makes an addition to the already rather numerous reports of efforts to find the meningococcus in the pharynx. Over 170 examinations were made: 35 upon patients suffering with meningitis, 120 upon people in the immediate surroundings of such patients, and about 30 control examinations. The meningococcus was found in 39 instances, but never in people who were not intimately associated with patients or were not themselves patients.

Foster,[2] in an article upon the etiology and diagnosis, draws attention anew to the great importance of the work being done upon the subject of the mode of infection in epidemic meningitis. It is too obvious to state that no intelligent efforts at the prevention of this disease can be made until there is some definite information upon this subject. The isolation of the patients and their friends is reasonable, but more because this is found wise in many other specific infectious diseases than because of any considerable evidence that the disease is contagious. Foster quotes from the report of the German Commission studying this disease. This body concluded that the infection starts in the pharyngeal tonsil and gains access to the cranium through the sphenoid bone; travelling along the vessels which run through this bone into the sella turcica, the pituitary body is the part of the brain first affected. The infection travels by means of the lymph vessels rather than the blood stream, and there is no evidence that it enters the cranium through the cribriform plate.

One cannot but agree with Foster when he says that although this conclusion is founded on very careful work, it cannot be accepted as the final word.

Particularly must one disagree with the conclusion that the infection travels by the lymph channels rather than by the blood stream. There are so many points of resemblance between this disease and pneumonia that, from purely theoretical grounds, one would expect to find the diffusion of the infective agent by means of the blood stream.

Last year, in this article, the opinion was expressed that ultimately this disease would be found to be a septicemia, and during the year the instances in which the Diplococcus intracellularis has been found in the circulating blood have been materially increased in number.

Flexner,[3] by means of a series of experiments, has shown that the lower monkeys can be infected with the meningococcus and made to reproduce the pathological conditions present in man in cerebrospinal

[1] Wiener klinische Wochenscrift, 1907, Nr. 1.

[2] American Medicine, 1907, xi, 30.

[3] Journal of Experimental Medicine, 1907, ix, 142.

meningitis. Diplococci introduced into the lower levels of the spinal canal reached the brain in a few hours and excited an acute inflammation, the exudate of which accumulates chiefly in the lower spinal meninges and the meninges of the base of the brain. This distribution of the exudate led Flexner to doubt the validity of the reasoning which would ascribe this localization of the inflammation in man to the entrance into the meninges of the infective agent directly through the nasal membrane.

This experimental work of Flexner appears also to have a bearing upon the question, suggesting, as it does, another explanation for the intense inflammation found in the basal meninges than the more obvious one of direct extension from the nasopharynx.

There have been during the past year a number of articles upon epidemic meningitis in the *Scottish Medical Journal*, due, no doubt, to the fact that Scotland, like so many other places in the world, has been suffering from this disease. An article by Elder[1] and Jevers attracted my attention particularly, because of a question which they raise in regard to the relation existing between the meningococcus and the pneumococcus. Although I appreciate the distinctions which bacteriologists make between these two organisms, I am still of the opinion, expressed in earlier volumes of PROGRESSIVE MEDICINE and elsewhere, that in the ultimate solution of the question of the relationship of these two microorganisms more attention will be paid to the striking similarity in many respects existing between the two diseases, pneumonia and meningitis, than has been the case to date.

In this connection it is of interest to note an article by Jacobitz[2] upon the diplococcus of cerebrospinal meningitis as a cause of diseases of the lungs and bronchi. He divides the cases into five groups: (1) Meningitis without complications; (2) meningococcus pneumonia with meningeal symptoms; (3) meningococcus pneumonia without meningeal symptoms; (4) meningococcus bronchitis without brain or cord symptoms; (5) diseases of the lungs due to mixed infection, meningococcus with other organisms. A number of examples of each of these groups is reported, and in each the diagnosis was made by bacteriological methods, confirmed by tests with serum.

This article simply furnishes additional evidence that the meningococcus is capable of causing clinical pictures frequently caused by the pneumococcus.

In this connection it might be profitable to indicate the points which infections with the meningococcus and the pneumococcus have in common. In the first place, both are sudden in their onset, often beginning so sharply that not only the day but the hour of onset can be definitely stated. Secondly, both diseases are associated with a polymorphonuclear leukocytosis.

[1] Scottish Medical and Surgical Journal, 1907, xx, 215.

[2] Zeitschrift für Hygiene u. Infektionskrankheiten, 1907, lvi, 175.

It will be at once objected that these two features are common to numerous other infections; but to the third point, the same objection cannot be raised. This third common characteristic, and the one which groups these two organisms together more closely than they are separated by the differences pointed out by the bacteriologists is the frequency with which herpes appears in the course of infections caused by either organism. While the sudden onset and leukocytosis may characterize a wide variety of infections, herpes is common in only one other disease, and that due to an infective agent of an entirely separate and distinct group, namely, malaria.

The character of the exudate upon serous membranes is the same for both bacteria, *i. e.*, polymorphonuclear. Here, however, appears a difference in the two organisms. The meningococcus easily yields to phagocytosis, while the virulent pneumococci, such as circulate in the blood, do not. Rosenow, however, has been able to show that if you lower the virulence of the pneumococci, as can be easily done in a variety of ways, they too easily fall the victims of the phagocytic action of the leukocytes.

The pneumococcus infections show a fourth peculiar clinical feature, the extremely low excretion of sodium chloride in the urine. This has usually been regarded as due to the exudate in the lungs, but a number of clinical observations upon cases of pneumococcus infection, without pulmonary involvement, have suggested to me that this peculiarity is a specific phenomenon of pneumococcus infections, irrespective of their localization. If an increasing number of cases confirms this observation, and if the same low chloride excretion can be shown to exist with epidemic meningitis, it will still further strengthen the idea that the pneumococci and the meningococci are, at least clinically, practically the same organisms.

In addition to these things, both organisms cause frequently the same pathological processes, the pneumococcus causing, with decreasing frequency, the pneumonia, the simple bronchitis, and the meningitis, while the meningococcus causes the same things, but in the inverse order of frequency.

Baginsky,[1] in an article entitled "Meningitis Cerebrospinalis Pseudo-epidemica," points out anew the sometimes insurmountable difficulties one may encounter in the proper classification of cases of acute meningitis. Many bacteria other than the diplococcus intracellularis, as streptococci, staphylococci, pneumococci, can cause a clinical picture perfectly resembling that of epidemic meningitis. Thus in the presence of an epidemic of meningitis, cases due to the action of other bacteria may be called epidemic, and, what is of greater importance, in the absence of a known epidemic, the earlier cases of a beginning epidemic may be

[1] Berliner klinische Wochenschrift, 1907, 385.

erroneously called non-epidemic. The only solution of the problem in some cases is the ultimate clinical course and the study of the cerebrospinal fluid.

In addition to this, one can add that a study of the bacterial content of the blood may be of very great service, for, as is clearly shown by cases which I have personally reported, the bacteria may be present in large numbers in the blood and the cerebrospinal fluid be almost sterile.

Instances of cases of *protracted epidemic meningitis* have been reported at different times by various observers, and to them Rohn adds two instances observed in the Franz-Josef Children's Hospital of Vienna. One case began May 2 and died July 2; the other lasted from December 16 to March 19.

Einhorn[1] discusses at some length the *herpetic eruption* so frequently seen in cases of epidemic cerebrospinal fever. The herpes, which in no way differ from those seen in the course of other infections, appear usually on the third to the sixth day of the disease. They vary in size, but by confluence may become large and cause such destruction of tissue that scar formation results.

The vesicles appear often in successive crops, so that they may continue to be present over a week or two.

Many authors state that the eruption of herpes in this disease is unusually abundant and further characterized by the fact that the vesicles appear in atypical places. They may appear on lips, cheeks, ears, neck, and eyelids. Particularly is one impressed by the frequency with which they appear on the ears. They are also seen sometimes on the mucous membranes.

Einhorn does not regard the herpes as having any prognostic significance.

To this one may add that the herpetic eruption is often an aid in determining the character of a given case of meningitis. Herpes may occur in tuberculous meningitis and in those due to the common pus organisms, but they do so rarely. The eruption is, however, of no help in distinguishing between cases due to the pneumococcus and those due to the meningococcus, for it is common in both forms.

Schultz[2] has an article upon *hydrocephalus as a result of epidemic meningitis*, with a report of a personal case, in which he tried to improve things by puncture of the ventricles of the brain. The sketch of the clinical picture he quotes from Goeppert, and is interesting. After the disappearance of the fever, delirium, and the other symptoms the child appears to be well on the road to recovery, when gradually it ceases to be interested in its surroundings, and no longer plays readily. The child, which has formerly been cleanly, becomes dirty. The general appearance of the child deteriorates; the color becomes bad.

[1] Wiener klinische Wochenschrift, 1907, xx, 700.

[2] Deutsches Archiv für klinische Medizin, 1906, lxxxix, 547.

Questions are no longer answered, and the child makes only the most automatic demands for water or food. Gradually the condition gets worse and worse. The head is retracted and the limbs in contracture, until, finally, the child dies of exhaustion.

In other cases, the symptoms of hydrocephalus directly follow those of the meningitis without any free interval between them. The symptoms are due to the prolonged increase of the pressure of the fluids in the brain.

Goeppert recognizes three groups of cases, according to the existence or extent of an obstruction to the communication between the cerebral ventricles and the spinal canal: (1) Cases with complete occlusion of the communications; (2) cases in which the foramen Magendie is closed but the foramina Luschkæ are compensatorily enlarged; and (3) cases without organic obstruction. The last group is numerically much the most common, while the first group is decidedly the smallest.

It naturally occurs to one to try the effects of *lumbar puncture.* This would serve as a drain in all cases except those included in the first group, in which drainage of the ventricles would be required.

Schultz hopes to see the pressure relieved by puncture earlier than it has been done formerly, and thinks that in this way the results may be improved.

During the year there have been relatively few articles upon the *treatment of the epidemic meningitis.* Apparently the profession has become convinced that the many purely empirical methods, which have been suggested and tired, are valueless, and have decided to await the development of some specific method of treatment, and in the meantime to employ purely symptomatic means.

Jochmann[1] makes an interesting report of work done in the way of preparing a *serum for the treatment of epidemic meningitis.* Omitting the account of the methods of preparation and the preliminary experimentation upon animals, we find that the serum has been used in 17 cases, in part subcutaneously, and in part intraspinally. Of this number, 5 died, 3 of them receiving the first injection late in the course of the disease. Of the others, 9 reacted with a rapid fall and permanent disappearance of fever. In the other cases, the headache and rigidity of the neck improved, and consciousness returned. The removal of fluid from the spinal canal, previous to the injection of the serum, aided in the improvement. While the number of cases is too few to warrant any conclusion, as Jochmann says, the serum does no harm, and at least fills the first requirement of all therapeutic efforts, *i. e., nil nocere.*

Later on, Schone[2] gives a more detailed report upon these and other cases, up to the number of 30, treated by this serum. He separates the cases into five groups, according to the way in which they reacted to the

[1] Verhandlungen d. Kongress für innere Medizin, 1906, 555.

[2] Die Therapie der Gegenwart, 1907, xlviii, 52.

serum treatment. Cases already convalescent, or in the stage of chronic hydrocephalus, were not given the serum.

Group 1.—Five cases, being the first cases treated, were given small doses at long intervals. These cases were not affected by the serum, either one way or the other. Three died and the others passed over into a state of chronic hydrocephalus.

Group 2.—Ten cases, treated by subcutaneous infections, as in Group 1, but larger amounts of serum were given. The results were equally negative, but later on, after preliminary drainage of a certain amount of fluid by spinal puncture, the serum was given intraspinally. This group of cases yields 10 recoveries and 1 death, and the experience that the earlier and the oftener the intraspinal injections are used the better the results.

Group 3 consists of 4 cases, which were benefited by subcutaneous injections.

Group 4 includes 4 cases which were treated without results, in spite of larger doses and both subcutaneous and intraspinal injections.

Group 5 includes 8 cases benefited by intraspinal injections. Usually 15 to 40 c.c. were injected after preliminary puncture, and then, for ten or twelve hours, the patient was kept in bed with the head low.

During the year 1906 in all 66 cases of epidemic meningitis were entered, with a mortality of 40 per cent. for the entire series. The mortality of the 30 cases treated with the serum was 27 per cent., and that of the cases not so treated was 53 per cent. For Flexner's work along these lines see PROGRESSIVE MEDICINE, December, 1907.

Diphtheria. The phase of this disease which has received more discussion during the year than any other is that of the *persistence of the bacilli in the throat* after the disappearance of all clinical evidences of disease. It is at once obvious that, so long as virulent bacilli are present, the individual carrying them is as dangerous, even more so, than during the period of active illness. The fact that they do remain for varying periods of time is generally known by the profession, but apparently many have not given the matter sufficient thought, and all who have to do with public health work know that many physicians are willing to release patients from quarantine as soon as the membrane disappears from the throat and nose. The need for educational work along this line is necessary both in the profession and among the laity. It is not possible to lay down any general rules, for there are so many exceptions that all cases should be terminated by culture. This will lead to a prolonged retention of some cases, but the average time may be shortened. In the 1906 volume of PROGRESSIVE MEDICINE attention was drawn to an article by McCullom, in which he states that the average time was shortened by the adoption of the rule not to discharge any patient until two successive cultures from the throat proved negative. Before this rule was adopted the average time of isolation was fifty-seven days.

Myer Solis-Cohen[1] reports a study of 27 cases personally observed by him, and concludes that cases, such as he reports, in which the bacilli are harbored for months, are a source of great danger to others. All cases of sore throat and the throats of all who have been in contact at school or at home with cases of diphtheria should be examined by culture, and no case should be dismissed from quarantine until two successive cultures prove negative.

The New York Board of Health has been especially active in studying this question, and Anna L. von Sholly publishes[2] a report of 1000 normal cases.

These cases give no history of recent or direct exposure to diphtheria, yet 18 cases harboring virulent diphtheria bacilli were found. In only 1 of these was there a history of possible exposure, and that several weeks before the culture was obtained. There were also 38 cases in which non-virulent diphtheria-like bacilli were found, and 266 in which the pseudodiphtheria bacillus was obtained.

A second series of 202 cases, made up of those in the immediate families of children suffering from clinical diphtheria, was examined; 14 of them showed virulent bacilli, 6 non-virulent organisms, and 25 the pseudodiphtheria bacillus.

Von Sholly especially emphasizes the fact that mild sore throats and "colds" with bloody nasal discharges should not be lightly regarded, for in many such cases cultures will show the diphtheria bacilli.

I think that emphasis should be added to emphasis upon this point. All cases with bloody or acrid discharges from the nose should be looked upon with anxiety, no matter how mild the other symptoms of illness may be. Long before bacteriological methods were introduced into clinical medicine, the child with a corrosive nasal discharge was looked upon as dangerous to others, but of late this old fact seems to have been in some degree forgotten. If cultures are made in all infections of the upper air passages, no matter what one's inclination in the matter of diagnosis may be, many unsuspected cases of diphtheria will be found.

A recent personal experience has shown me an instance of the unhappy results which may follow neglect of this precaution. The patient, a married woman, had a sore throat some months ago, and a diagnosis of syphilis was made from the appearance of the throat. Following the throat infection came paralysis of the pharynx, with paralysis of accommodation, sensory disturbances, in the way of tingling and numbness of all four extremities, with a marked ataxia of the legs. This is as typical a postdiphtheritic multiple neuritis as one could ask to see, and yet this poor woman had been kept under iodides and mercury for months and under the belief that she was syphilitic. Had a culture been made at the time, the error would not have been made.

[1] Pennsylvania Medical Journal, 1907, x, 971.

[2] Journal of Infectious Diseases, 1907, iv, 210.

In an earlier number of the same journal Pennington reports work done in the laboratory of the Philadelphia Board of Health. In addition to work upon normal children she reports work upon the throats of convalescents; 22 of 25 cases examined for release from quarantine showed virulent organisms, and one instance is noted in which virulent bacillus were found after forty-five days. Others have reported the bacilli for much longer periods than this.

Pennington also found that 10 per cent. of well school-children have in their throats a bacillus which corresponds morphologically with the organism of diphtheria. One-half of these organisms are without effect upon guinea-pigs, but about 30 per cent. of them behave like attenuated diphtheria bacilli, and 14 per cent. of them kill the experimental animal with fair promptness.

Meikle[1] also discussed carefully and at length the question of the persistence of bacilli in the throats of convalescent diphtheria patients, basing his report on a study of 300 cases. His attention was mainly concentrated upon the following points: (1) The mean duration of the persistence of the bacilli; (2) the number of consecutive negative examinations which should be obtained before a patient is discharged; (3) is the duration of the persistence affected by season, sex, age, number of days of illness previous to admission, the amount and position of the membrane, the amount of antitoxin, the date of disappearance of the membrane, the condition of the throat in convalescence, and by local antiseptic treatment. The average time at which the bacilli disappeared from the throat was 18.4 days, counting from the day when the bacilli were first found.

Meikle has tabulated the average duration of the persistence of the bacilli as reported by various observers as follows:

	Days.
Park, from disappearance of the membrane	8
Morse, from disappearance of the membrane	10
Bissel, from disappearance of the membrane	14
Cobbet, from disappearance of the membrane	18
Tobiesen, from disappearance of the membrane	10
Massachusetts Board of Health, from disappearance of membrane	27
Graham Smith, from disappearance of the membrane	28
Woodhead, from disappearance of the membrane	52
Walsh, from disappearance of the membrane	22
Roux and Lersin, from disappearance of the membrane	13.6
Meikle, from first demonstration of bacilli	18.4

Deducting Woodhead's series, in which there were several instances in which the case was detained for more than 100 days, we get an average of 22.9 days. From this we can deduct a general rule, which can serve in cases in which the release from quarantine cannot be controlled by

[1] Edinburgh Medical Journal, 1906, xx, 510.

culture, as should be done whenever possible. The patient cannot be considered free from infection until at least three weeks after the membrane has disappeared.

The number of consecutive negative cultures which should be aimed at is three, but not less than two should be demanded.

Park and Beebe made 2566 cultures on 742 cases, an average of 3.5 per case. Graham Smith made three examinations the rule in his investigations, and in the Edinburgh City Hospital the average was ten.

Meikle also points out an interesting fact, namely, the persistence of the bacilli is influenced by season, averaging longer during the fall and winter months than in the spring and summer. The average was 22.84 days for December and 12.43 days for March. Sex has no influence, but age has, the bacilli persisting longer the younger the individual. The difference, however, is but slight up to eighteen years.

One would, as Meikle did, expect that the bacilli would disappear more rapidly from the throats of those receiving treatment early in the disease, but he found that there was no material difference.

The location of the membrane and the amount of antitoxin given also seem to have no influence upon the time the bacilli persist.

The presence of enlarged tonsils favors the persistence of the bacilli. Thus, of 27 cases discharged with the bacilli still in the throat, 22, *i. e.*, 86.5 per cent., had enlarged tonsils, while the whole group of children showed but 38 per cent. of enlarged tonsils.

The local use of antiseptics, while cleaning the affected mucous membrane and removing products of decomposition, do not materially shorten the persistence of the bacilli.

DIPHTHERIA AND TONSILLITIS. Albert[1] prints an interesting article upon laboratory and clinical observations in diphtheria. The details may be omitted, but it is interesting to note that diphtheria bacilli were found in 60 per cent. of the cases which were clinically diagnosticated as diphtheria, while they were found in 15 per cent. of the cases in which a diagnosis of non-diphtheritic inflammation of the tonsils, pharynx, or nose was made. They were also found in 36 per cent. of the cases in which a diagnosis of "possibly diphtheria" was made.

Of 1938 cases of diphtheria, 1203 occurred among school-children. This may be explained in part by the fact that diphtheria is more frequently seen in children, but it also suggests that the school-room plays an important part in the diffusion of the disease.

In 1453 out of 2038 cases under observation, the source of infection was not known. We must conclude either that diphtheria bacilli may survive some time on various substances, such as dirt and dried sputum, which, experiment has proved, is rather improbable, or that infection is due to so-called "bacilli carriers."

[1] Journal of Infectious Diseases, 1907, iv, 210.

MILK AS A MEANS OF CARRYING DIPHTHERIA. The importance of milk as a carrier of infection has been repeatedly shown. A recent instance is the now well-known epidemic of scarlet fever in a suburb of Chicago. To the instances already on record is another, added by Harrington,[1] who reports an interesting example of a diphtheria epidemic due to the sale of milk by a producer in whose family there was a case of diphtheria. The milk was sold to two dealers upon whose milk routes 69 cases of diphtheria developed within seven days, and 32 on one day. This article is illustrated by some interesting charts, which are well worth the attention of anyone particularly concerned with this phase of the question.

PURPURIC ERUPTIONS IN DIPHTHERIA. There have been during the year a few articles upon some particular phase of diphtheria. Among them is one by Fysche and Hunter,[2] who briefly describe 2 severe cases of diphtheria, associated with purpuric eruptions. Such hemorrhages as described may occur in any infectious process, and, with the exception of the various processes grouped under the name of primary purpuras, are evidence of the severity, rather than of the nature, of the infection. They have been seen before with diphtheria, but are rare, as is shown by the article by McCrombie, who noted 200 cases of purpura among 6755 cases of diphtheria. Most of these cases terminated fatally.

EMBOLISM OF THE BRAIN IN DIPHTHERIA. Last year we noted an article by Rolleston in which he discusses hemiplegia as a complication of diphtheria. During the current year Escherich[3] reports an instance of embolism of the brain in the course of postdiphtheritic cardiac weakness. The case was one of severe diphtheria, entering the hospital on the fifth day of the disease with moderate laryngeal stenosis. The same day paresis of the right half of the body was noted. Death occurred two days later. The autopsy showed a mural thrombus in left ventricle, with an embolus in the left median cerebral artery.

The formation of cardiac thrombi in the course of certain infectious diseases, while not common, is frequent enough to be held in mind. It occurs oftenest in typhoid and diphtheria, and is something which can neither be foreseen nor prevented.

MENINGITIS DUE TO BACILLUS DIPHTHERIA. There have been in the past few years a small number of cases recorded in which the diphtheria bacillus has entered the blood stream and located upon some of the deep-seated tissues, such, for example, as the endocardium. The cases, however, are so rare that each new one attracts attention. A new case has been added by Morrell and Wolf,[4] who report a novel instance of infection with diphtheria bacilli. The case was that of a negro child, pre-

[1] Boston Medical and Surgical Journal, 1907, clvi, 848.
[2] Montreal Medical Journal, 1907, xxxvi, 183.
[3] Wiener medizinische Wochenschrift, 1907, 474.
[4] Journal American Medical Association, 1906, xlvii, 2138.

senting the clinical picture of cerebrospinal meningitis. From the spinal canal they obtained a bacillus presenting all the morphological and pathogenic properties of the bacillus of diphtheria. The autopsy, made four days later, six hours after death, showed a general miliary tuberculosis, with tuberculous and exudative meningitis. Cultures from the heart blood were negative, but those made from the meningeal fluid and the exudate at the base of the brain yielded the same organism isolated at the two previous spinal punctures.

THE PULSE IN DIPHTHERIA AND SCARLET FEVER. The subject of the effects of acute infectious diseases upon the heart has been repeatedly referred to in these articles because of its very obvious importance.

Owen Peters[1] discusses irregularity of the pulse in diphtheria, and brings out some interesting and important new facts. He contends, in the first place, that irregularity of the pulse is not peculiar to diphtheria, nor more common in it than other diseases, especially *scarlet fever*, with which he makes comparison. He kept careful track of the pulse in 92 cases of diphtheria and 95 cases of uncomplicated scarlet fever, and found in 80 per cent. of the cases of the former disease and 92 per cent. of the latter that there was some irregularity of the pulse during convalescence. He notes also that the younger the child the more frequently irregularity is met; thus, in children under five years of age irregularity occurred in 100 per cent., irrespective of the disease. The percentage found by Peters corresponds almost exactly, as he points out, with that recorded by Villy, who found 87.5 percentage of irregular heart action in 177 cases of diphtheria.

Peters noted, however, that in most cases the irregularity was the regular variation in force and frequency of the pulse to which the term pulsus paradoxus is applied, *i. e.*, the irregularity is merely an exaggeration of a normal phenomena, and is probably nervous in origin rather than due to a complicating myocarditis. In addition to this type of irregularity, one meets a small number of cases of true irregularity probably in about 7 per cent. In these cases there is a true arhythmia, not an allorhythmia, and its cause is to be sought in a myocarditis. This true arhythmia is a serious matter, as is also the bradycardia, and so long as either exists the child should be guarded and kept in bed. The other type, the common one of irregularity, does not constitute a sufficient reason for keeping the child quiet.

INTUBATION IN DIPHTHERIA. Reich[2] publishes a careful and detailed report of the experience with intubation in the Children's Hospital of the University in Munich gained during the past fifteen years. The series is a very large one—1323 operations upon 3032 cases of diphtheria—*i. e.*, 49.3 per cent. of the cases entered. The report is valuable

[1] Lancet, September 14, 1907.

[2] Jahrbuch f. Kinderheilkunde, 1907, lxv, 299 and 457.

not only on this account, but also because it serves to accentuate certain points brought out in paragraphs upon this subject in earlier numbers of PROGRESSIVE MEDICINE.

For example, it is shown that the use of the serum has lessened materially the number of cases requiring intubation. This fully accords with experience elsewhere, and this, too, in spite of the fact that one intubates now upon less urgent indications than formerly.

The mortality has been materially reduced. Before the use of the serum the percentage of recoveries was 28.6, while since then the percentage is 64. The greatest change in the percentage of recovery shown is in children under one year, an age at which diphtheria is, fortunately, exceptional. Before the antitoxin days the recoveries numbered but 3.7 per cent., since then 16.7 per cent.

Another fact accentuated by the report is the unfavorable influence of complications with other diseases either previous or subsequent to the diphtheria. Thus the cases of primary diphtheria with secondary complications gave recoveries in 44.5 per cent., while primary infections with secondary diphtheria gave only 29.1 per cent. of recoveries. The combination most to be feared is that of diphtheria and whooping-cough. All of 8 cases of *whooping-cough* with secondary diphtheria died, while 13 cases of primary diphtheria with secondary pertussis out of 17 recovered.

In order to remove the tube for feeding, a silk thread was left fastened to the tube. This seems to me to be an error in technique, and in a hospital where conditions can be controlled, unnecessary. Another and more serious error is the length of time which the tube was left in the larynx. The average period in the cases ending in recovery was eleven to thirteen days. Prolonged hoarseness was frequently observed, and its duration was, with a few exceptions, proportionate to the length of time the tube was left in place. *Decubital ulcer in the larynx* resulted in 9.9 per cent. of the cases. This is a result of intubation which I have never seen, and I believe that this is due to the short period—three to four days—which the tube is left in the larynx.

Reich points out, as contraindications to intubation, the presence of great swelling in the pharynx and entrance of the larynx, spasms of the glottis. In other words, it is useless to intubate when an obstruction exists which will be above the upper end of the tube when it is in place. He might also have added that the intubation tube is useless when the obstruction is too low in the trachea to be reached by the tube.

In addition to this article by Reich is one of much the same nature by Moltshanoff,[1] who reviews the literature upon *diphtheria of the larynx* in nursing babies, and adds the experience of ten years in the Moscow hospital. During this period 21 children under one year of age required

[1] Jahrbuch f. Kinderheilkunde, 1907, lxv, 64.

intubation for diphtheria. The results are materially better than those reported by Reich, for 11 of the 21 recovered. He points out the difficulties in the way of intubation resulting from the very small dimensions of the pharynx and larynx in these children, and that here a short tube is useful.

The difficulties in the way of feeding these babes may sometimes be so great as to require tracheotomy in place of intubation.

Marfan[1] again draws attention to the manual method of removing an intubation tube from the larynx. The child is placed face downward on a table, with head hanging over and supported. The finger and thumb are then placed on each side of the trachea and the tube gently expressed. The method is marvellously simple and efficient and should always be the one first tried.

For some reason a knowledge and appreciation of this very simple procedure is not as widespread as it should be. All who have to do intubation realize that the instrumental removal of the tube is far more difficult than its insertion. Nothing can be easier than this method, as I can testify from personal experience.

Dysentery. The literature upon dysentery has been singularly devoid of clinical articles, and this is particularly true of the English literature. There have been scattering articles upon isolated cases, but most of these have been by Japanese and Indian writers. This is natural, for in their respective countries this disease is of much greater importance than here. There have been a number of laboratory articles upon the various forms of dysentery bacilli and the pseudodysentery bacillus, but nothing which yet yields other than interesting laboratory results.

Vaillard and Dopter, in the *Annals of the Pasteur Institute*, publish an additional report upon the clinical use of *antidysenteric serum*. Their first report, covering 96 cases, was noted in the last article in PROGRESSIVE MEDICINE. To this number they now add 243 cases, partly under their own care and partly from other hospitals in France and elsewhere.

Of 200 cases treated in France, 101 were moderately severe, 55 grave, 19 very serious, and 25 regarded as moribund. Of this number, 10 died, including also the cases dying at the moment when the serum was injected. This gives the very low mortality of 2 per cent. The value of the serum, however, is shown not only by the lessened mortality, but also by the relief afforded the patients and the rapidity with which they recover. The abdominal pain is relieved in a few hours, the tenesmus lessens, the blood and then the mucous disappears from the stools, which become fecal. Cases of moderate severity recover in from twenty-four to forty-eight hours. Grave cases, having from 100 to 200 passages per day, do not recover so quickly, lasting four or five up to ten or fifteen days.

[1] Revue mensuelle d. malad. de l'enfance, 1907, xxv, 193.

Influenza. D. J. Davis,[1] in an article last year, commented upon the finding of influenza bacilli in the sputum of patients suffering from *whooping-cough*, and this year publishes additional studies upon certain properties of these bacilli as they occur in whooping-cough and other acute infectious diseases.

In 68 cases of whooping-cough influenza-like bacilli were isolated in 61 cases. Usually they were found on the first examination, but in 6 instances in which there was opportunity to examine the sputum previous to the onset of the paroxysmal stage they were not found until later. Pneumococci were found in every specimen.

The influenza bacillus was found in 13 of 23 cases of *measles*. Pneumococci were always present. Streptococci were numerous in a few cases.

Influenza-like organisms were isolated in 7 of 11 cases of *varicella*.

The sputum of a number of adults suffering from various infections was studied. Influenza bacilli were found in 5 of 12 cases of bronchitis, but they were found only 3 times in 17 cases of typical clinical influenza. The occurrence of the influenza bacilli in so few of the cases of clinical influenza is worthy of comment. The cases were all diagnosticated clinically as acute influenza, and were typical in their symptomatology. It is undoubtedly true that most of the cases reported as clinical influenza, at least in recent years, are not influenza infections at all, but are due to other organisms, principally streptococci, pneumococci, and perhaps the micrococcus catarrhalis. It appears to be true that a number of organisms can produce practically an identical clinical picture, and this has come to be known as influenza or la grippe since the great epidemic of 1889–90. The influenza bacilli found so frequently in the throat in infections of various kinds has a low virulence for animals.

The January number of *The Practitioner*, 1907, is given up to a series of articles upon influenza, contributed by some of the best-known men of England, and furnishes a very complete and readable review of this subject. Anyone especially interested in this disease cannot do better than to read this series. Allbutt writes the introductory article in his own fascinating way, making comments upon the various articles making up the series, and pointing them with his personal opinions and observations.

The protean character of this disease, said by Allbutt to be the most protean of all protean diseases, is repeatedly referred to, but of the various types which have been described Moore picks out the following as most prominent:

1. The neurotic, neuralgic, or rheumatic type.
2. The cardiopulmonary type, in which the ebbing of the strength in elderly people is sometimes severe, often absolutely beyond control.
3. The gastric or gastro-intestinal type, in which anorexia is present.
4. The febrile type, which prevails especially among children.

[1] Journal of the American Medical Association, 1907, xlviii, 1563.

Moore also points out the relatively low direct mortality, this being about 2 per cent., and, in contrast, the generally observed fact that during epidemics of influenza the number of deaths from pulmonary disease is greatly increased.

West comments upon the postfebrile depression, speaking of it as perhaps the most remarkable characteristic of influenza. This may last for ten days or two weeks after the fever is over. It is both mental and physical, and is often very severe. There is no relation between the severity of the attack of influenza and that of the subsequent depression.

I think that many who have had personal experience with influenza will recall this subsequent depression, but will not agree with West that it passes off in a week or two. Allbutt speaks of cases in which it ceases very suddenly, so that the patient can specify the day and the hour.

West points this fact with the history of a patient who suffered for a month with the most painful depression after a very mild attack. "All interest in life was gone, and he hardly seemed to care to live. He was for a time profoundly melancholic. After a month, quite suddenly, at 12 o'clock in the day, he said a cloud seemed suddenly to lift off him, and he exclaimed all at once, 'I am well again,' and all his depression disappeared."

More than fifteen years ago Pfühl[1] pointed out that the bacillus of influenza could be demonstrated in the exudate in a limited number of cases of *meningitis*. Since then a limited number of cases of this sort have been added to the literature—in all about 20. In most instances the infection is not pure, the Pfeiffer bacillus being found in association with some other organism.

To this number of cases Douglas adds a new case, that of a babe of ten months. The clinical history and course was that ordinarily seen with meningitis; the bacteriological examinations made during life by means of the lumbar puncture were confirmed postmortem, after an illness of eight days.

Malaria. Relatively little has been written upon this subject during the year; even the subject of malarial hemoglobinuria, upon which so much was written last year, has been quite neglected. Perhaps the most interesting article is the brief one by Moffat, to which reference is made later.

Craig[2] discusses at length the important question of *latent and recurrent malarial infections*. By a latent infection he means one in which the plasmodia of malaria may be demonstrated to be present in the blood of an individual in whom no clinical symptoms of the disease, of sufficient gravity to attract attention, are to be observed. His conclusions are

[1] Lancet, 1907, i, 86.

[2] Journal of Infectious Diseases, January, 1907

based upon 1653 cases of malarial infection, of which 424, a little over 25 per cent., were latent infections. Of these cases, 110 were tertian, 8 quartan, 297 estivo-autumnal, and the balance mixed infections. Most of these cases were American soldiers, but 115 of them were natives of the Philippine Islands.

In many instances the latent malarial infection was found in combination with other diseases. The importance of the recognition of such cases is obvious. They are a source of infection to the mosquitoes; and, secondly, the recognition of such an infection during a period of latency furnishes grounds for treatment which will prevent the development of a sudden pernicious attack.

Craig, in his study of the natives of the islands, found that 28, *i. e.*, 62 per cent., of 45 adults showed malaria plasmodia. He thinks the examination of a large number of cases would reduce this high percentage. Of 180 children, 48 per cent. showed the organism. The infections in children diminish in number with advancing age.

In regard to recurrent malaria, Craig says that probably, with very few exceptions, every primary attack of malaria is followed by one or more relapses or recurrences. By a recurrence he means the appearance of symptoms due to the same group of organisms that caused the original attack and not a new infection by another group. It is obviously impossible in many instances to be sure that the reappearance of symptoms is not due to a reinfection unless a different type of parasite be present than that found during the initial attack. Craig believes that for practical purposes Celli is right in reckoning "as recurrent every case of fever which repeats itself in the same individual from July of one year to the end of June of the following year, or during all the cycle of the same yearly epidemic." Craig publishes a table of 55 instances of relapse, and concludes that in estivo-autumnal infections relapses occur oftenest between the twentieth and fortieth day after the initial attack, while in benign tertian infections the relapse is oftenest between the fifteenth and twenty-second day.

He concludes that intracorpuscular conjugation is the chief cause of the maintenance of malarial infections. A form of the plasmodium results which is resistant to quinine and other injurious influences. Such forms remain latent until conditions are favorable, when it gives birth to several young plasmodia, thus causing a recurrence of the infection.

In cases which have been treated at once with sufficient doses of quinine, and for a sufficiently long period, intracorpuscular conjugation is never seen, and in such cases relapses are very rare, if they ever occur.

Ford[1] reports some interesting work done with the idea of developing an *antitoxin for malaria.* A series of monkeys and goats were inocu-

[1] Journal of the American Medical Association, 1907, xlviii, 133

lated with the defibrinated blood of patients showing the plasmodium. Later, the serum or defibrinated blood of these animals was given to 20 cases of tertian malaria, with the result that 17 of them recovered without further medication, and 3 were uninfluenced by the injections. Two of these were instances of quartan infection, while in all instances material from tertian infections were given the animal used in the preparation of the serum. Similar negative results were later obtained when the serum was given to cases of estivo-autumnal malaria. This is in line with the observation of Koch, that an acquired immunity to one type of infection gave no immunity to the attacks of some other type of organism. As a control experiment, 16 cases of tertian infection were given no treatment except rest in bed on a milk diet, with a result that only 2 cases recovered spontaneously.

Moffat[1] publishes a brief note upon a case of *congenital malaria.* The mother acquired malaria in Africa, and, for this reason, returned to England, where the child was born four months later. At the age of seven weeks the child was anemic, and an examination of the blood showed the plasmodium of the malignant type.

It has generally been denied that intra-uterine infection with malaria is possible. The passage of bacteria through the placenta is now admitted by all, but the passage of protozoa is not. Bearing on this point is the fact that the young of rats infected with trypanosomes often are born with these organisms in the blood.

Pneumonia. Nothing can be more trite than to say that to those who live in temperate regions there is no other acute infectious disease which approaches this in importance. Usually there is a very considerable literature yearly upon this subject, but this year, in spite of the fact that this disease interests me personally more than any other in this group, but little has been found to warrant comment.

The most important question, namely, that of treatment, has been almost entirely neglected, and in this, as already stated, one finds cause for encouragement, as it indicates a more general appreciation of the nature of the disease.

There have been during the year no statistical articles and very few discussing special phases of the disease.

PNEUMOCOCCI IN THE BLOOD STREAM. In an article from the v. Jaksch Clinic in Prague, by Hoke, I find the first recognition in German literature of the fact that the pneumococci can be demonstrated in the blood in so high a percentage of cases of pneumonia that one is justified in the belief that they are always present, and that the finding of them does not influence the prognosis. Hoke found the bacteria by blood culture in 24 of 26 cases, and, inasmuch as but 2 of this series died, he concludes that the bacteriemia is not of prognostic significance.

[1] British Medical Journal, 1907, i, 1054.

ICTERUS IN PNEUMONIA. Blumberg,[1] in an article upon croupous pneumonia, with icterus, discusses particularly two phases of the question: (1) Does the site of the pneumonia influence the onset of icterus? (2) Is there any relation between the severity of the pneumonia and the icterus?

The basis of the discussion is 300 cases, of which 21, *i. e.*, 7 per cent., presented icterus. Twelve of these were right-sided, 8 left-sided, and 1 bilateral. He concludes that the site of the pneumonia has nothing to do with the causation of the icterus.

In regard to the second question, he adopts as the basis of measurement of the intoxication the appearance of *albumin in the urine.* This is a very poor basis of calculation, for practically all cases of pneumonia show more or less albuminuria. He found that 86 per cent. of the jaundiced cases showed albumin and 88 per cent. of the others. He concludes from this that there is no relation between the severity of the case and the presence of jaundice, but states that the mortality of the 21 icteric cases was 19 per cent., while that of the others was 11.34 per cent., *i. e.*, only a little more than half the mortality shown by the cases of icterus. It is obvious that one cannot draw conclusions from such figures as these, for there are so many factors entering into the mortality of pneumonia, but I am confident that most who have had much to do with pneumonia will not agree with Blumberg, but would unite in saying that the jaundice is an expression of a severe infection.

Slight grades of jaundice may be disregarded, but all cases with well-marked icterus should be gravely regarded, for it not only indicates a grave infection in pneumonia, as in any other septicemic process, but in itself is a source of danger.

It has been repeatedly shown that jaundice, irrespective of its cause, has a deleterious effect upon the heart, causing it to dilate and cause such incoördination in the action of the papillary muscles of the heart as to cause leaking of either or both auriculoventricular valves. When one recalls the well-established fact that in the heart lies the great danger in pneumonia, the existence of a complication, which in itself alone may seriously alter the heart's action, must cause grave anxiety. Even in the exceptional cases, where the jaundice is probably due to a gastroduodenitis, not to hemolysis, it must be considered as a serious thing.

Blumberg's conclusion that the site of the pneumonia has nothing to do with the causation of true icterus is quite in accord with that reached by others who have studied the same question.

PROGNOSIS IN PNEUMONIA. Affleck[2] has an interesting article upon the important subject of the prognosis in pneumonia. After an expression of the opinion that pneumonia is a more serious disease today than it was a few decades ago, he discusses some general points in prognosis. The outlook for the patient is largely dependent upon what the patient

[1] St. Petersburger medizinische Wochenschrift, 1907.

[2] Scottish Medical and Surgical Journal, 1907, xx, 295.

brings to the pneumonia—age, habits, previous health, existing disease, etc. Uncomplicated pneumonia in health, youth, and middle age may be expected to run a favorable course, while in older people, *i. e.*, over sixty, the death rate is not less than 50 per cent., no matter what the previous health and habits of the patient were.

There is nothing which influences the prognosis in pneumonia more unfavorably than previous *alcoholism*. All the advantage which youth and vigor might present in combating an attack of pneumonia is undone by alcoholism, and the young are as apt to succumb as the old.

Affleck quotes the following figures from the Edinburgh Royal Infirmary to point his remarks upon the deleterious influences of alcoholism: In 1899–1900, of 19 alcoholic pneumonias, 17 died; in 1900–1901, of 5 alcoholic pneumonias, all died; in 1901–1902, of 22 alcoholic pneumonias, 18 died.

Among the facts which manifest themselves at the onset of the disease, and which influence the prognosis, Affleck mentions the grave significance of the profound toxemia sometimes noted in patients who are strong and middle-aged. Vomiting and severe abdominal pain at the onset have also an unfavorable significance. Profuse sweating, early in the course, and without any accompanying fall in temperature, is a bad sign.

Marked and persistent insomnia is a grave symptom.

Cases with a persistent, very high temperature warrant an unfavorable prognosis, as do cases which run their course without much elevation of temperature. The most important factor in the prognosis is the condition of the heart. In favorable cases the pulse in adults rarely exceeds 120; when it approaches 130 the prognosis is grave, and when it reaches 140 the patient rarely recovers.

A favorable crisis is constituted by a coincident fall in temperature, pulse, and respirations, by the reappearance of chlorides in the urine, and by the aspect of relief the patient wears. Any failure in conformity to these critical events must ever be regarded with anxiety or suspicion. Thus, should the temperature fall, but the pulse continue rapid, there is reason for anxiety. Any symptom of faintness or collapse about the time of the crisis is of evil omen.

With these conclusions one can agree in the main, although one may question the correctness of the statement that patients rarely recover if the pulse reaches 140. Three years ago I published a table showing the influence of maximum pulse upon the mortality, and reproduce it here:

Maximum pulse.	Cases.	Deaths.	Per cent.
Under 100	57	2	3.5
100 to 110	123	7	5.7
110 to 120	143	18	12.6
120 to 130	288	62	21.5
130 to 140	143	68	47.0
140 to 150	125	74	59.0
150 plus	83	64	77.0

This is not entirely in accord with the statement of Affleck, and one can condense the table into this statement: that with a pulse under 120, the mortality is less than the average; between 120 and 130, it is the average; and above 130, the mortality is above the average mortality.

GANGRENE FOLLOWING PNEUMONIA. Last year attention was drawn to an article by Attix reporting a case of gangrene of both legs following pneumonia, and this year Lee[1] reports another instance of the same sort. The patient was an eighteen-year-old girl, with a good previous history. She presented the usual clinical picture of an uncomplicated pneumonia, ending by crisis on the eighth day.

On the tenth day trouble in the right leg began, followed on the next day by trouble in the left. Three days later a distinct line of demarcation appeared, and both legs were amputated. Since then the patient has steadily improved.

Lee has collected 10 cases from the literature, in which gangrene of the extremities has followed pneumonia. In all these cases there is no evidence given that there was endocarditis or other heart complications present.

TREATMENT OF PNEUMONIA. Efforts to employ the methods of Wright in the treatment of the diseases discussed in this section have been very limited indeed, the work along the lines of the opsonotherapy being almost entirely confined to local infections. We note, however, one article by Boellke,[2] in which he reports 15 cases of pneumonia treated by a *vaccine* prepared from cultures obtained from the sputum. In no case was the vaccine prepared from a pure growth of pneumococci. The reports of the cases are so brief that one cannot reach definite conclusions, but the impression made is that the clinical course was not materially influenced nor shortened. The author, however, states that in all cases the opsonic index was raised, the increase beginning usually about twenty hours after the injection of the vaccine, which, as he employed it, contained from 150 to 200 million of bacteria per dose.

In contrast with this article, one may note one by Rosenow[3] upon human *pneumococcal opsonin*, in which he points out that virulent pneumococci do not absorb opsonin and are insusceptible to phagocytosis, while avirulent pneumococci absorb opsonin and are taken up by phagocytes.

Extracts or autolysis of virulent pneumococci in NaCl solution brings into solution a substance or group of substances which inhibits the action of pneumococco-opsonin; avirulent pneumococci take up the substance and now become not only resistant to phagocytosis, but exhibit also to some degree the property of animal virulence, while the pneumococci from which the substance has been extracted acquire the power of uniting with the pneumococco-opsonin.

[1] Cleveland Medical Journal, June, 1907.

[2] Deutsche medizinische Wochenschrift, 1907, 1489.

[3] Journal of Infectious Diseases, 1907, iv, 285.

Acute Articular Rheumatism. ETIOLOGY. One of the important questions yet unsettled in regard to this disease is its etiology. Is it a specific infection, due, as so many believe, to the micrococcus rheumaticus, or may it be due to any one of a number of organisms of the streptococcus type? Much evidence has been accumulated in support of each idea.

Beattie,[1] who has done a great deal of experimental work, in an effort to solve the problem, summarizes as follows his comparative experiences with *streptococcus* and *micrococcus rheumaticus* injections:

SUMMARY (STREPTOCOCCUS).

Inoculations:	
Intravenous	34
Intraperitoneal	7
Subcutaneous	3
Both intraperitoneal and subcutaneous	4
Total	48
	Per cent.
Number of deaths	7, or 14.5
Number of animals with arthritis	9, or 18.7
Number of animals with endocarditis	1, or 2

In all cases the arthritis was distinctly purulent. In those injected subcutaneously, pus formed at site of injection. The animal with endocarditis showed multiple pyemic abscesses.

SUMMARY (MICROCOCCUS RHEUMATICUS).

Inoculations:	
Intravenous	13
Into knee-joint	1
Subcutaneous	1
Total	15
	Per cent.
Number of deaths	2, or 13.3
Number of animals with arthritis	9, or 60
Number of animals with endocarditis, including one doubtful case	5, or 33.3

In all, the arthritis was non-purulent. Recovery or improvement took place if the animal was allowed to live.

Beattie also found that in uncomplicated cases of acute rheumatism the organism is not usually found in the blood or in the joint exudates.

RHEUMATISM IN CHILDHOOD. One of the most striking and important peculiarities of this disease is the difference in its clinical picture in children and in adults. The pain, the number of joints involved, and the elevation of temperature in adults are so much greater than in children that one might infer that it is a more serious disease for the former than the latter, but this is not true. The adults suffer more immediately

[1] British Medical Journal, 1906, xi, 1781.

and for a short time, but the children suffer most ultimately, because of the vulnerability of the endocardium in childhood. There is nothing new about this, but the matter is of such importance, and so frequently forgotten, that it seems well to quote somewhat extensively an article by Dunn upon rheumatism in childhood.

Dunn[1] discusses some of the important peculiarities of this disease as it presents itself among the young. He utilized as a basis for his article 300 cases in the Children's Hospital of Boston.

These cases he divided into three groups: (1) With arthritis on admission, 102 cases; (2) with endocarditis only on admission, 140 cases; (3) with pericarditis on admission, 58 cases. From another standpoint the cases were divided as follows: (1) Acute infections, 223 cases; (2) chronic endocarditis, 77 cases. Of the 223 cases of acute infection, there were 121 showing at entrance no evidences anywhere but in the heart.

Dunn notes among the articular cases that the joint symptoms are very mild. Only exceptionally did he see redness, heat, swelling, and intense pain, and these exceptions were more common the older the children, most of them being among children of ten to twelve years. The joint symptoms were also very transient; one day or less in 64 cases, two days in 12, three days in 14 cases, four to six days in 10 cases, one week or more in 2 cases.

Polyarthritis was uncommon, usually more than one joint was affected, but rarely very many. A very noticeable feature was the frequency of signs of endocarditis. Of the whole number (102), 85 cases showed signs of valvular endocarditis, and only 17 children left the hospital with apparently normal hearts.

A comparatively large number of cases showing heart signs also had symptoms referable to the heart, an observation in marked contrast to the rheumatic fever of adults, where endocarditis is apt to develop insidiously. Only 27 patients had no heart symptoms, whereas 45 had precordial pain or dyspnea; 30 had dyspnea and distinct signs of failing compensation.

In a number of instances the cardiac symptoms preceeded the articular.

Of the 300 cases, 281 showed at some time signs of endocarditis.

Of the group of 140 cases diagnosed as endocarditis at entrance, the lesions are distributed as follows:

	Cases.
Mitral insufficiency only	70
Mitral stenosis only	1
Aortic insufficiency only	1
Double mitral	56
Aortic and mitral	12

Of this group, 77 were instances of chronic endocarditis and 63 of acute. Of the latter group, 56 gave a definite history of joint symptoms,

[1] Journal of the American Medical Association, 1907, xlviii, 493.

while 7 gave nothing to connect them with rheumatic fever except their own clinical picture. The history of joint changes was found less often in the cases of chronic endocarditis, being obtained in but 46 of the 77 cases.

Dunn points out these peculiarities of rheumatism in childhood: (1) The comparative mildness of the articular symptoms; (2) the relative frequency of cardiac manifestations; (3) the large number of cases in which there are only cardiac changes, actually more than the cases having articular symptoms only; and (4) the frequent occurrence of endocarditis or pericarditis as the primary manifestation.

Dunn also points out another well-established fact, namely, the frequent association of *chorea* with rheumatism. Of the 300 cases considered, there were 86 which gave a history of chorea, *i. e.*, 29 per cent., while of the 121 cases of chorea admitted during the same period, there were 57 per cent. who gave a distinct rheumatic history.

The practical lesson to be drawn from such reports as these is this: Don't regard rheumatism in childhood, even though it may involve only two or three joints for a day or two, and consist only of pain in the joints, as a trivial thing, and, even when careful examination fails to show any change in the heart, nevertheless be as careful of the child as if an endocarditis was obviously present. Keep the child quiet in bed for weeks. You may do this unnecessarily in some cases, but it is a safe rule to follow, and the ultimate good obtained will be great.

Horn[1] publishes an interesting article upon *rheumatic nodules in children*. Such nodules and their associations—chorea, rheumatism, and endocarditis—have been known for years, but appear to be much less common, or are at least less often noted, here than in England and on the Continent. They are much more common in children than in adults. Thus, of 86 cases collected by Barlow, Warner, and Lindmann, 66 were under fourteen years of age. The youngest child recorded as showing the nodules was aged three and three-quarter years, and they have been seen in adults up to fifty years.

Their frequent association with endocarditis has been frequently noted. Scheele found 34 cases of endocarditis in 42 cases of the rheumatic nodules.

Horn closes his article with these conclusions:

1. Rheumatismus nodosus is a disease of the tendons and periosteum in various parts of the body, usually near the joints, bilateral and symmetrical. It leads to the formation of fibrous nodules. It is of a rheumatic nature, but is usually free from temperature or discomfort.

2. It is not a disease sui generis. It is never primary, and occurs only in rheumatic individuals, in association with or independent of other rheumatic manifestations.

[1] Wiener klinische Wochenschrift, 1906, xix, 1410.

3. It usually attacks children under the age of puberty, oftener the females.

4. It is always accompanied by severe changes in the heart valves, which will, sooner or later, lead ad exitum. Cases with this complication must be regarded as showing a certain malignancy.

5. The appearance of these rheumatic nodules in the course of a disease of unknown origin stamps the disease as rheumatic.

RHEUMATISM IN ADULTS. In interesting contrast with this is an article upon rheumatism as it appears in adults, contributed by Phillips,[1] who reviews 210 cases of acute articular rheumatism seen in Cleveland. The cases made up 1 in every 27 admissions to the medical service of the hospital.

The influence of occupation and season is pointed out in the paragraphs upon the etiology, as is also the important influence of age. Of the 210 cases, only 11 were under twelve years of age; 58 per cent. of the cases were between the ages of twenty and forty.

Among the symptoms it is noted that no case presented a temperature over 104°; the pulse ranged from 100 to 120. During the acute stage a moderate leukocytosis, from 12,000 to 20,000, was present. The blood underwent rapid deterioration, the hemoglobin sometimes falling to 45 per cent., and the red blood corpuscles to 3,500,000.

Albumin was found in no less than 67 per cent. of the cases, usually in faint traces, but in larger amounts in some of the cases presenting cardiac complications. Casts of the hyaline type were found in 30 per cent. of the cases. Both the albumin and casts disappeared in convalescence.

The joints most often involved were the left knee, 120; right knee, 115; left ankle, 98; right ankle, 80; left shoulder, 60; and so on down through other joints to intervertebral and sacro-iliac joints, 1 each.

Endocarditis is the commonest complication. Undoubted valvular lesions were found in 30 per cent. of the cases. In only 28 cases was the endocarditis fresh.

Pericarditis occurred in 10 cases, of which 2 were fatal.

Nervous complications occurred in 13 cases, oftenest delirium.

Subcutaneous fibroids were observed in 4 patients, aged six, fifteen, twelve, and twenty-nine years, respectively. They are oftenest over the backs of the elbows, at the margins of the patella, and along the malleoli, but may occur anywhere over a bony surface. They may be very numerous, 1 of Phillips' cases having 70 in all. They vary in size, being usually as small as a pea, but they may be as large as a hazel-nut. They are quite freely movable. They are of prognostic importance in that they are generally associated with an endocarditis.

In discussing the treatment, after laying down the ordinary rules for the care of such patients, Phillips points out the way in which he em-

[1] Cleveland Medical Journal, 1906, v, 436.

ploys the *salicylates;* and, while the method is not peculiar to him, I think it well to point it out, for it is the right way to use this very important group of drugs, a group which is often blamed because given improperly. The underlying idea in the use of salicylates is to push them until they cause toxic symptoms, and to do this in the briefest possible space of time, Phillips gives 20 grains every hour, in combination with sodium bicarbonate and well diluted, and keeps this up until the toxic symptoms disappear.

There is no question about the relief this will give, but it is questionable whether the salicylates, no matter how given, shorten the disease.

THE THYROID GLAND IN RHEUMATISM. Last year attention was drawn to an article by Vincent, in which he points out the frequency with which the thyroid gland becomes acutely swollen in the course of various acute infectious diseases. He noted it particularly in rheumatism, and this year he contributes a further article, giving increased details and an account of an effort to make practical application of his observation. He[1] believes that this gland will sometimes furnish us with a means of prognosis. He has observed swelling and tenderness of the thyroid gland in 74 cases of acute rheumatism. These signs are absent in the benign forms and in the chronic rheumatisms. Usually the changes in the thyroid run a parallel course with those in the joints, increasing and decreasing as the latter do, but there are some cases in which the thyroid becomes normal in size and free from pain in spite of the continuation of the joint changes. In such cases one may anticipate a slow and prolonged course in the joint alterations. From this Vincent infers that an insufficiency of the secretions of the thyroid has something to do with the prolongation of the rheumatism. It may be that, as Torri and Turro suggest, the thyroid secretion has some antibacterial or antifermentative powers, but it may equally well be that the secretions have something to do with the defensive process of the organism against rheumatism. This suggestion may offer an explanation for the well-established efficacy sometimes shown by iodine and the iodides in subacute and rebellious cases of rheumatism. Naturally, Vincent has tried the effect of thyroid medication in cases of obstinate rheumatism, but in only a small number of cases in but 4. In 2 of these he saw no results, but in both the others the effect was marked, the patients rapidly improving.

The suggestion is worth trying, and may serve to aid us in the care of these cases, often so troublesome.

AMYLOID DEGENERATION IN RHEUMATISM. Beattie[2] describes an uncommon result of acute articular rheumatism with cardiac complications in the shape of amyloid degeneration, and publishes notes of 4 such cases. In all there was a distinct rheumatic history. One case had the first attack of rheumatism seven months previous to death, 1 was of a

[1] Bull. et mém. de la Société médicale de Paris, 1907, 373.

[2] British Medical Journal, 1906, xi, 1444.

year's duration, and the others gave a history extending over several years.

The kidneys showed amyloid changes in all 4, in 3 the spleen, in 2 the intestines, and in 1 the liver. No case showed them in all four of the usual sites. All 4 of the cases showed old endocardial changes.

BIER'S HYPEREMIA IN THE TREATMENT OF RHEUMATISM. Klemperer,[1] although not the first by any means to employ the Bier congestion method to the treatment of acute articular rheumatism, is the first to publish the results obtained in any long series of cases. The band was applied for from two to four hours, twice daily, above the inflamed joints, tight enough to cause a hot, red congestion. Usually the congestion was well borne, but in a few instances small doses of morphine became necessary. The method could not be applied to the shoulder or hip-joint, and in cases where these joints were seriously involved, and in those in which the fever became excessive, *aspirin* was given. In all, 87 typical cases of acute articular rheumatism were treated: 48 with congestion only, 20 with congestion and later with aspirin in addition, and 19 cases were treated with aspirin only.

Of the first group of 48 cases, 19 recovered within four to seven days; 15 from eight to ten days; 11 from eleven to thirteen days; 9 from fourteen to twenty days.

Of the second group of 20 cases, 5 recovered within eight to ten days; 2 from eleven to thirteen days; 3 from fourteen to twenty days.

Of the third group of 19 cases, 3 recovered in from six to seven days; 5 from eight to ten days; 2 from eleven to thirteen days; 4 from fourteen to twenty days. Fifteen cases were unbenefited by either the congestion or aspirin. Seven of the 48 cases treated by congestion developed cardiac complications, while 5 of the 19 aspirin cases did.

Of the entire series of 87 cases, 68, *i. e.*, 78 per cent., were adapted to the use of congestion, and of those so treated 70 per cent. recovered within twenty days.

Seventy-three per cent. of the cases treated by salicylates recovered. The salicylates thus accomplish more than the congestion, but, nevertheless, a considerable number of cases recover under congestion only. This method requires more time and patience than does the aspirin, but it is free from danger and should be tried when any reason exists for avoiding the salicylates.

Scarlet Fever. ETIOLOGY. Hektoen[2] reviews the ideas now current as to the relation which streptococci bear to scarlet fever. At present the *streptococcus* is believed by some to be the actual cause of the disease, while others, probably the majority, think of it as essentially a secondary invader, on which depends, to a large extent, the fate of the patient. Hektoen concludes, from the facts at hand, (1) that the predominating

[1] Die Therapie der Gegenwart, 1907, 255.

[2] Journal American Medical Association, 1907, xlviii, 1158.

feature of the bacteriology of the throat in scarlet fever is the constant presence of large numbers of streptococcus pyogenes; (2) that the overwhelming majority of the so-called complications and of the deaths in scarlet fever are due to invasion of the tissues and the blood by this microbe; and (3) that in scarlet fever, even when mild, the organism gives evidence of systemic reaction to streptococci by variations in the streptococco-opsonic index, and probably, also, by the formation of streptococco-agglutinins.

In speaking of the bearing which the streptococcus theory has upon the view of the method of spread of this disease, Hektoen points out the universally accepted belief that the scales from the skin are potent factors in the spread of the disease, yet only a small percentage of the cases show streptococci in the scales, and that while there are numerous instances in which the scarlatinal virus remained active over several years of time. Weaver was not able to cultivate streptococci from material preserved more than ninety days.

The view that the streptococcus is a secondary invader in scarlet fever receives indirect support from the fact that smallpox, when fatal, is practically always associated with streptococcus invasion, so that the suggestion has been made that smallpox also is a streptococcus disease.

Whether the streptococcus is the true cause of the disease, or merely avails itself of a path prepared for it by the true but yet unknown cause, the need for potent antistreptococcus remedies is as urgent, and their eventual specific effects as logically explainable, as would be the case were scarlet fever considered a streptococcus disease pure and simple.

Bearing upon this same question is an article by Tunnicliff upon the *streptococco-opsonic index*, illustrated with a number of charts which show clearly the basis for the conclusion reached by her, namely, early in the course of the disease the opsonic index is below normal. In uncomplicated cases the index rises to a point well above the normal as the acute symptoms subside. This rise does not continue long, and may end abruptly. Providing no complications develop, the index remains normal from this time on, but local streptococcal complications are accompanied by a depression of the streptococco-opsonic index, which rises again as improvement takes place.

Brandeis[1] makes an interesting suggestion, based upon observations made among the tenements of New York. He was impressed with the fact that when scarlet fever appeared among the usually large families living in the tenement neighborhoods, secondary cases in the family were exceptional, and this, too, in spite of the fact that isolation of the patients was impossible, because of the overcrowded condition in which the families live. He tabulates a series of 25 families in which there were thirty-nine children who had never had scarlet fever and who did not acquire the disease.

[1] New York Medical Journal, 1907, lxxxvi, 166.

Whether or not children of the same family are less likely to take scarlet fever from each other than from other children is a question, and one which might prove to be of importance.

IODOPHILIA IN SCARLET FEVER. Neutra[1] has been studying the question of iodophilia in scarlet fever, and while it is not possible to quote him extensively, it is worth while noting that he always finds some, and usually a considerable degree of, iodophilia in scarlet fever, and believes that in cases of suspected scarlet fever an entire lack of this reaction speaks against the diagnosis. He also thinks that the early disappearance of the reaction has a favorable prognostic significance. This is in contrast with Kaminer, who failed to find an iodophilia in scarlet fever.

HEMORRHAGIC DIATHESIS IN SCARLET FEVER. Among the articles upon special features of this disease is one upon the question of hemorrhagic diathesis developing. This is, fortunately, an unusual event, but occurs with scarlet fever, as it does with all infectious processes.

Klose[2] has been led by a personal experience with a case of scarlet fever, complicated by a hemorrhagic diathesis, to review the literature of this subject. A hemorrhagic form of scarlet fever has been recognized for years, and the cases separated into two not very sharply defined groups, according to the severity of the hemorrhagic diathesis. One form, characterized by large hemorrhages into the skin, and from the mucous membranes, especially of the nose and mouth, is fortunately rare, for it is always fatal. The other form is by no means uncommon, and shows punctate hemorrhages confined to a limited area.

The case reported was a well-nourished child, with a moderately severe scarlet and a punctate hemorrhagic rash on chest and back at the time of entrance. This rash spread, and the hemorrhages into the skin increased in size, and later there were hemorrhages from the mucous membrane. These continued for some weeks, but in about two months the child recovered sufficiently to go home, having received a number of subcutaneous injections of gelatin solution.

However, even after being discharged, hemorrhages appeared at intervals, and after months of recurrences the child finally died, thirteen months after the onset of the scarlet fever.

THE HEART IN SCARLET FEVER. In PROGRESSIVE MEDICINE for March, 1905, considerable space was given to a discussion of the effects which various infectious diseases have upon the heart, and a most excellent article by Schmaltz upon the cardiac changes in scarlet fever was quoted. Since then the matter has quite disappeared from medical journals, but is this year taken up by Troitzky,[3] who considers carefully the *functional disturbances of the heart* during scarlet fever. The fre-

[1] Zeit. f. Heilkunde, 1906, xxvii, 433.
[2] Deutsche medizinische Wochenschrift, 1906, xxxii, 2073.
[3] Archiv f. Kinderheilkunde, 1907, xlv, 393.

quency with which *tachycardia* appears early in the course of scarlet fever, even before the appearance of the rash, and its diagnostic value has been repeatedly pointed out for years, but the subject outlined in the title of Troitzky's paper deserves much more study than it has yet received. Among other things, the author points out that the injurious influence which the scarlet fever exercises over the heart and bloodvessels is one of the most constant results of the disease. The functional disturbances appear at all periods of the evolution of the disease, but they are not always proportionate to the severity of the case involved or the epidemic in which the case occurs.

In this disease, as in all the acute infections, too much attention cannot be paid to the heart, and it should not be forgotten that there are other things in a human heart more important than the valves, and that changes in the heart muscle, while they may not declare themselves by murmurs, are nevertheless more important than valvular defects.

NEPHRITIS IN SCARLET FEVER. Thompson[1] considers what we must agree is one of the most important questions in connection with scarlet fever, the *prophylaxis of nephritis.*

Nephritis must be regarded as a part of the disease, and from the onset care must be taken to avoid, if possible, this serious part of the disease. The diet and medical supervision of the patient must be strict. A diet of milk and cereal foods must be insisted upon for the first three weeks. The patient should be encouraged to take plenty of diluents so long as there is no evidence of fluid collecting in any part of the body. All methods of excretion should be encouraged.

The only drug which has proved to be of value as a prophylactic measure is *urotropin.*

The use of chloral hydrate in the treatment of scarlet fever was reviewed in PROGRESSIVE MEDICINE for December, 1907.

Tetanus. This is another disease which, a few years ago, was the subject of many extensive articles, and has now almost disappeared from literature. Why this should be it is impossible to say, but almost all of the articles upon it during the year have been reports of isolated cases, not presenting features of especial note.

Anders and Morgan[2] publish a statistical paper upon *tetanus neonatorum,* which is full of valuable data. Such papers represent an immense amount of labor, and compile at great personal sacrifice a mass of information in convenient form for the use of others.

During the census years 1870 to 1900, inclusive, there was a total of 4778 cases of tetanus neonatorum. The cases are widely spread, but certain areas, like the District of Columbia, Illinois, Louisiana, and Pennsylvania, contribute an undue number.

The months of March, July, September, January, and June give

[1] Edinburgh Medical Journal, February, 1907.

[2] Journal American Medical Association, 1906, xlvii, 2083.

the largest number of cases, the five months showing a total of 60 per cent.

The date of the appearance of the tetanic symptoms varies from less than one day to beyond two weeks; 146 cases began within nine days; 173 between nine and fifteen days.

The mortality is high, 57.2 per cent. The authors close their article by a reference to cases collected by personal correspondence, numbering 31 in all.

The relatively infrequent and always interesting variety of tetanus known as the *Rose or head tetanus* is carefully reviewed by Friedlander.[1] The stimulus to the article was furnished by a patient who received a number of wounds in the region of the right eye, caused by a fall on a very dirty street. Six days later trismus appeared, and speech and chewing became almost impossible; later, paralysis of the right facialis. Movements of the head, body, and limbs were in no way restricted. Great difficulty in swallowing, due to spasm of the esophagus, gradually developed; the pharynx became so irritable that inspiration was at times difficult. It became impossible to feed the patient except per rectum, and while tetanic phenomena did not at any time affect the muscles of the trunk and limbs, the patient died finally of exhaustion after nineteen days of illness.

This case, like others of this variety of head tetanus, followed a wound of the head; and again, like most cases, a wound in the orbital region. Like most other cases of this variety there was great difficulty in swallowing, a phenomenon which has suggested and justified the name "tetanus hydrophobicoides" for cases of this sort.

Possibly the most striking feature of the case is the paradoxical appearance among the spasms of the paralysis of the facial. The fact that the upper branch of the nerve was involved, and that the other cranial nerves were free, points to a peripheral paralysis. The unimpaired hearing and the paralysis of the posterior auricular nerve speaks for the canalis Fallopiæ as the site of the lesion.

The nature of the paralysis in this, as in other cases, is a matter of discussion. In some cases, although Friedlander is certain that this is not true in this instance, the paralysis may be due directly to the trauma, of which the tetanus is a complication. Some have thought the paralysis of a reflex nature, but it must be admitted that this explanation does not clear the matter up to any degree.

A third and popular hypothesis is that the paralysis is due to the tetanus toxins, which, in the laboratory, have been shown by Brieger, Fraenkel, and others to have paralytic as well as convulsive powers. Brunner has shown that in rabbits and guinea-pigs large quantities of the poison cause local paralytic phenomena in the region of the site of

[1] Deutsche medizinische Wochenschrift, 1907, 1124.

injection. Rose, on the other hand, contends that the paralysis is due to a neuritis of the facial.

THE TREATMENT OF TETANUS is so extremely unsatisfactory that efforts are being made to develop some better method. The latest method is that proposed by Metzer and Auer, the use of magnesium sulphate. Some clinical use has been made of their suggestion, but as yet in too few instances to warrant any conclusion.

A review of this use of magnesium sulphate will be found in PROGRESSIVE MEDICINE, December, 1907.

Koster,[1] after reporting a case of tetanus successfully treated by *intraneural injections of tetanus antitoxin*, reviews briefly the results so far obtained by the four methods which have been employed in giving this antitoxin.

The subcutaneous use is dismissed as a method of treatment, although its value as a prophylactic measure is admitted by Koster as by others.

The intraneural method, so far employed in but few cases (Koster being able to find but five reports), has so far yielded the lowest mortality, only 25 per cent. The nerve trunk to the area of the infection atrium is exposed, and the injection made obliquely and centripetally into the nerve.

If subsequent injections are necessary, Koster thinks it better to expose the nerve at some higher point rather than to make two injections into the same spot.

The injections into the spinal canal, after the removal of as much of the spinal fluid as possible, has been employed in more cases, but they have not been assembled sufficiently to permit of figures as to the mortality. The operation is much simpler than the intraneural injections, and can be easily repeated daily.

The last and the most difficult method is that of subdural or intraventricular injection after opening the skull. In 1904 Hopkins collected 147 cases treated in this way with a mortality of 61 per cent.

Tuberculosis. It is impossible to make anything like a review of the literature of this subject, and even an attempt to do so is quite worthless. So much that is written on all subjects is a re-hash, and this is truer of tuberculosis than of almost any other subject.

HUMAN AND BOVINE TUBERCULOSIS. The question of the duality of the human and bovine tuberculosis may now be accepted as settled in the affirmative. The two forms of bacilli, while, of course, closely allied, are nevertheless distinct. Ordinarily, each confines its activities to its own particular territory, but there is no question of the fact that each may affect the host ordinarily reserved for the other. One phase of the problem still subject to discussion is whether or not the bovine tuberculosis is more apt to attack individuals of certain ages.

[1] Die Therapie der Gegenwart, 1907, xlviii, 49.

It has been repeatedly stated that *primary intestinal tuberculosis in childhood* is very uncommon, yet Wagener's, Eden's, and Ipsen's studies in Kiel, Berlin, and Copenhagen show that among 289 children between the ages of one and fifteen years, examined postmortem, there were no less than 44 instances of this disease. In connection with this, one must remember that for every case of tuberculosis in which one may feel certain that the process was primarily intestinal, there are probably several in which, because of the wide diffusion of the process to other organs, one can only suspect, though with justice, a primary intestinal origin.

Fibiger and Jensen,[1] of Copenhagen, who in the past have repeatedly written upon this same subject, report additional cases of primary intestinal tuberculosis in children, which, they believe, to be due to *milk infection*. They have in all studied 7 cases of primary tuberculosis of the digestive tract in children between the ages of four months and twelve years, and in at least 5 of these found bacilli which showed great virulence when injected in calves. In 3 of these cases it is certain that the children were fed over a long period upon raw milk from a source which could not be studied, and in one instance the child had raw milk from a dairy where one cow had tuberculosis of the udder. In none of these cases could any other source of infection be found.

From this work and from work of others reported in the literature these authors conclude that raw milk is an important cause of the primary tuberculosis of the intestines in childhood.

PIRQUET'S TUBERCULIN TEST. During the year two new methods of using tuberculin as a diagnostic aid have been described, one by Calmette, consisting of an instillation into the eye of minute amounts of tuberculin, which, in the eye of one who is tuberculous, causes redness and hypersecretion for some hours, while it does not do so in one who is not tuberculous.

The second method, and one which has been more extensively used, is that of Pirquet,[2] who describes a new method of employing tuberculin as a test in cases of suspected tuberculosis. A mixture of Koch's old tuberculin with one part of a 5 per cent. carbolic and glycerin mixture, with two parts of normal salt solution, is used. The skin of the forearm is washed with ether, a drop of the above solution put on the skin, which is then punctured through the drop. It is well to do this in a couple of places and make one or two controls in the neighborhood with salt solution.

Without any general disturbances a local reaction takes place within about forty-eight hours. The skin around the site of the inoculation swells up and becomes red, and a papule forms. This is usually about 1 cm. in diameter, of a bright-red color, gradually becoming pigmented. The pigmented area is sometimes visible for weeks. In cases of severer

[1] Berliner klinische Wochenschrift, 1907, p. 93.

[2] Wiener medizinische Wochenschrift, 1907, 1369.

reaction, an urticarial spot may appear at the site of inoculation, and in some rare instances a vesicle develops.

The formation of the papule usually begins within the first twenty-four hours, and, as a rule, reaches its maximum in forty-eight hours. This may be called a prompt reaction, in contrast to the instances of torpid reaction, which begin only after forty-eight hours. These slow reactions occur mainly in older children, who show no clinical evidences of tuberculosis.

In 69 cases, which were certainly tuberculous, Pirquet failed to get the reaction in but 11. Among 116 nursing babes, 5 reacted, and of these, 3 later went to the autopsy table and proved to be tuberculous; 23 cases, which during life gave no reaction, were later found free from tuberculosis on the autopsy table.

In older children and in adults a reaction is obtained in a very high percentage of the cases, as would be expected, from the great frequency of tuberculosis at this period (97 per cent., according to Burkhardt).

The advantages of this method, should it prove to be what Pirquet and those who have been working with him in Vienna believe it to be, are so obvious as to require no comment. It will prove, as Pirquet points out, especially valuable in large institutions for children, where the children can be systematically tested for tuberculosis every few months.

Pregnancy and Tuberculosis. Weimberg[1] discusses at some length a question often referred to the general practitioner, namely, the effect of pregnancy upon the course of tuberculosis, and the opposite phase of the same question, the effect of an existing tuberculosis upon the fetus and child. The paper is based largely upon statistics.

Tuberculosis, especially when advanced, is prone to cause abortion, or, even more frequently, premature delivery. The child may be born dead or die during the first year, either from tuberculosis or from the effects of artificial feeding.

The unfavorable influence of pregnancy upon an existing tuberculosis is often overestimated when an opinion is based purely upon personal experience. Statistics show that the mortality from tuberculosis during the first year after delivery is not essentially higher than among married women of the same age and social condition.

During the first four weeks after delivery the mortality from tuberculosis is very high, because of the frequency with which impending death from tuberculosis precipitates premature delivery.

Typhoid Fever. Blood Cultures in the Diagnosis of Typhoid Fever. There have been certain phases of this disease studied this year which have materially increased our knowledge. One of the most important questions considered is that of early diagnosis by means of blood

[1] Beiträge z. klinik d. Tuberkulose, 1906, Heft 3.

cultures. There is no question that in the near future this will be the means by which many cases will be recognized earlier than is otherwise possible. The work so far done shows that the method is applicable to public health work, and will, no doubt, soon be adopted as a routine part of such laboratories.

The clinical value of blood cultures in the diagnosis of infective diseases has been so far restricted because the methods were difficult to carry out remote from the laboratory.

Conradi,[1] by combining the suggestions made by a number of investigators, has devised a simple method applicable to the diagnosis of typhoid fever by blood cultures. Using even the small amounts of blood sent to the laboratory for examination of the Widal reaction, he was able to obtain a growth in 40 per cent. of 60 cases examined, and expresses the opinion, with which all must agree, that were larger amounts of blood, up to 1 or 2 c.c., used, the percentage would be much higher. As others have done, he found the highest percentage of successful cultures in the earlier part of the course of the disease—14 positive cultures in 25 cases examined during the first week.

The method is as follows: The clot is withdrawn from the capillary tube used to collect the blood and placed at blood temperature for twelve to sixteen hours in a sterile mixture consisting of 5 c.c. of ox-bile, 10 per cent. of peptone, and 10 per cent. of glycerin. From this plate cultures on litmus, sugar of milk, and agar are made.

The method is so simple that it promises to be of great value. The diagnosis of typhoid fever can be made earlier and with greater certainty by blood culture than in any other way.

Veil[2] emphasizes anew the fact that in the early diagnosis of typhoid fever the blood cultures are of much greater value than the Widal reaction, while the opposite is true during the later weeks of the diseases.

In a series of 36 cases observed during the first week of the disease the blood cultures were positive in 78 per cent. and the Widal reaction in but 50 per cent. During the second week, in a series of 110 cases, the cultures were positive in 60 per cent., and the agglutination was present in 92 per cent. Cases studied during the third and fourth week of the disease gave progressively fewer and fewer results on culture, while the percentage of cases showing agglutination remained about the same as during the second week.

The Excretion of Urobilin during Typhoid Fever. Another and far less important increase in our means of diagnosis of typhoid fever is suggested by Rubin,[3] of the Freiburg clinic, who has been studying the excretion of urobilin during typhoid fever. He finds that a curve of the amount is the reverse of that of the temperature. As the tem-

[1] Münchener medizinische Wochenschrift, 1906, 2387.
[2] Deutsche medizinische Wochenschrift, September 5, 1907.
[3] Münchener medizinische Wochenschrift, 1907, liv, 507.

perature rises the amount of urobilin in the urine decreases and remains at a low level until the first gross irregularity in temperature appears, when the amount of urobilin suddenly increases and then gradually falls as the temperature becomes more and more nearly continuously normal.

This may sometimes be of help in diagnosis, for a high excretion of urobilin early in the course of a suspected typhoid speaks against that diagnosis.

CHRONIC TYPHOID BACILLUS CARRIERS. One of the most significant discoveries of late years in regard to typhoid fever is the existence of chronic bacillus carriers. Everyone now admits the serious part they take in the diffusion of the disease, but there has been much discussion as to the site in which they harbor the bacilli.

Levy and Kayser[1] are the first to publish a report of an autopsy upon one who was known to have been a chronic typhoid bacillus carrier. The great importance of the fact that a patient may continue to harbor typhoid bacilli for years after having had typhoid, and to excrete them in the urine and feces, is at once obvious, and any report increasing our knowledge upon the subject is welcome.

The organs examined by Levy and Kayser were from an individual who had typhoid fever in 1903, and since then had continued to harbor the typhoid bacilli, as was shown by repeated examinations of the stools. Death resulted from an acute febrile disturbance, and examination showed the bacilli in liver, spleen, and gall-bladder. They were found also in large numbers in the bile and in the interior of gallstones.

Rosenthal[2] reports an interesting example of a chronic typhoid bacillus carrier, and the injurious influence which such an individual has upon those about her. During the course of a small epidemic they found typhoid bacilli in the stools of a healthy woman of forty-two, who in 1878 had a disease diagnosticated as nervous fever, at a time when typhoid fever was epidemic in the neighborhood in which she lived. They looked back over the records of the police, and found that during the last ten years 13 cases of typhoid fever had occurred among the people intimately associated with her. In some years it was found that from 5 to 20 per cent. of all the typhoid reported occurred among her associates.

Dehler,[3] having a patient of this sort whom he could not free from bacilli, decided to drain the gall-bladder, and did so, letting the bladder drain until cicatrization prevented further escape of bile. The gall-bladder and cystic duct were drained, and, beginning two weeks after the operation, were irrigated with boric acid solution. At first typhoid bacilli were found in the bile, but in seventeen examinations after the twenty-first day they were not found. Later, they reappeared, to finally

[1] Münchener medizinische Wochenschrift, 1906, 2434.
[2] Deutsche medizinische Wochenschrift, 1906, 1933.
[3] Münchener medizinische Wochenschrift, 1907, liv, 779.

disappear permanently. The feces, which had always shown the bacilli in thirty-seven examinations, extending over two years, contained no bacilli four days after the operation, and they never reappeared. The urine also remains free from the bacilli. At the time of the report the patient had been free from the bacilli for six months.

Soper[1] prints a very interesting account of a chronic typhoid carrier whom he has recently studied. The house epidemic which he was called upon to study occurred in August, 1905. After exhausting all other possible sources of infection, he was led to hunt up a cook who had entered service in the family shortly before the epidemic occurred. The woman refused to give any information about herself, but he was able to trace her for a part of the preceding ten years, and found that typhoid fever had broken out in seven of eight families in which she had worked. In all, 26 cases occurred, with 1 death. Brief accounts of the various epidemics are recorded. After getting this information, it was laid before the New York Board of Health. The woman was taken to the Detention Hospital, where repeated examinations of the stools showed the typhoid bacilli in large numbers.

The discovery of the chronic carrier of typhoid bacilli has raised the question, How can these people be freed from the bacilli and thus rendered safe members of society? Efforts have been repeatedly made, without results, by such means as regulation of diet and the administration of laxatives, chloroform, disinfectants, and the like.

In another paragraph reference is made to an autopsy made upon such a bacillus carrier, in whom the gall-bladder was found to harbor the bacilli. This postmortem observation corresponds with those of Foster and Kayser, who found the bacilli in the gall-bladders of 7 persons dead of typhoid and with the clinical finding of these organisms in people operated for gallstones or cholecystitis.

Blood Pressure in Typhoid Fever. The question of the blood pressure in typhoid and other acute infectious diseases has not yet received the attention which the subject deserves, so that one welcomes the report of a study of the blood pressure in a series of 81 cases, as reported by Barach.[2]

The cases were of the ordinary type, although there were more complicated with pneumonia than is usually seen in a series of this size. The observations were made at six-hour intervals with a Stanton instrument.

In a general way, the blood pressure falls early in the disease, to remain low until convalescence is established. The pressure is usually below 100. The factors controlling the blood pressure are obscure, but it is certain that the pressure bears no constant relation to pulse rate or temperature. A blood-pressure chart is of value in estimating the prognosis. A steadily falling pressure means danger, and so long as the

[1] Journal American Medical Association, 1907, xlviii, 2019.

[2] New York Medical Journal, 1907, lxxxvi, 348.

pressure keeps at a reasonable level, we may feel that there is a reserve power.

It is probable that a study of the blood pressure will give valuable hints as to the means of combating circulatory disturbances.

An opportunity to study the effects of hemorrhages was given by 5 cases; 4 had a fall of 20 mm., and 1 of 30 mm. Such falls in pressure, especially when gradual, show nothing, for equally great changes are seen for which there is no obvious explanation.

Perforation occurred in 1 case, but there was no effect upon the pressure.

One patient developed an edema of the larynx, and as the dyspnea increased, the pressure rose steadily up to 125. After tracheotomy, and relief of the dyspnea, it feel within twelve hours to 65.

Raising the foot of the bed had no effect on the pressure.

Whisky in half-ounce doses, every three hours for three days, did not affect the pressure.

Strychnine in doses of grain $\frac{1}{30}$ did not change the level of the pressure, but served to keep it evener.

Infusion of digitalis in doses of a half-ounce every four hours did not increase the pressure.

Nitroglycerin, gr. $\frac{1}{100}$ every four hours, caused a slight fall in several cases.

Huchard and Amblard[1] point out and illustrate with cases the prognostic significance of sudden increase in blood pressure in the course of typhoid fever. Such an elevation of pressure, with slowing of the pulse and a gallop rhythm, they have found to precede by several hours the appearance of serious complications, such as hemorrhage or perforation. Sometimes, however, these changes in the character of the pulse are forerunners of an increase in the severity of the general symptoms rather than of either of the complications noted.

The value of these changes in the pulse as an aid to prognosis has been pointed out before, especially has attention been directed toward the gallop rhythm, but the profession does not avail themselves of them as much as they should, possibly because the gallop rhythm is not always as obvious as it might be.

Sheppard[2] reports his observations upon the *relation of blood pressure to perforation in typhoid fever*, based upon 5 cases, and reviews the literature.

Crile reported observations on 5 cases, as follows:

Case 1. Blood pressure rose from 116 to 190 in four hours.

Case 2. A rise from 84 to 110 promptly.

Case 3. Rose from 116 to 165 in two hours.

Case 4. Pressure was 165; not previously noted.

Case 5. Pressure was 206; not previously noted.

[1] Revue de médecine, 1907, xxvii, 629.

[2] Lancet, 1907, i, 1293.

Crile found the average blood pressure for 115 cases of typhoid fever to be 104; varying between 138 and 74, the pressure gradually decreased until the fourth or fifth week, when the average was 96 to 98.

Briggs also reports a case in which the blood pressure rose from 106 to 144 in four hours, and four hours later the patient suddenly developed typical signs of a perforation.

The 5 cases reported by Sheppard, omitting all details except as to pulse-rate and blood pressure, are as follows:

Case I. Blood pressure 88 and pulse 120. Two hours after onset of the symptoms of perforation pulse 140 and pressure 116. Later, pulse 130 and pressure 90. Two hours before death pulse was 136 and pressure 92.

Case II. Pulse 116 and pressure 94 before symptoms of perforation. After these appeared pulse 150 and pressure not below 110, but unable to measure it accurately because of small size of pulse.

Case III. Blood pressure had averaged 136, but on the twentieth day he complained of abdominal pain and the pressure was found to be 120, with a pulse of 94. Twelve hours later pulse 80 and pressure still 120. Died next day.

Case IV. Entered on twenty-fifth day, with pressure of 112 which later fell and at death on the fifty-third day was 94.

Case V. On the seventeenth day pressure was 90. Two days later there was some abdominal pain all night, and at 8.30 A.M. the pulse was 158 and the pressure 92.

In these cases the rise in blood pressure is not constant, as in Crile's series, and Sheppard thinks that a rise in blood pressure should speak in favor of the diagnosis of perforation when such a complication is suspected.

Loss of Weight in Typhoid Fever and Pneumonia. Klier[1] publishes a report upon a short series of observations, made in v. Jaksch's Clinic, upon the comparative loss of weight in typhoid fever and pneumonia. Such observations as these have been reported at intervals by Leyden, Kohlschütter, Curschmann, and others, but the sum total is not large. Klier's figures correspond, so far as typhoid fever is concerned, with those previously reported. The loss of weight begins promptly after the onset of the disease, and continues slowly and progressively until the temperature reaches normal, when the weight begins to increase much more rapidly than it was lost.

The loss of weight is slower than that observed by Lehman, Munk, Senator, and others in healthy people voluntarily submitting to starvation, the loss ranging from 0.15 to 0.3 kilogram in typhoid as compared with 0.6 in the latter cases.

The curve of weight was very different in the pneumonia observed. Here the weight increased for the first three days of observation, prob-

[1] Präger medizinische Wochenschrift, 1907, 103.

ably the sixth, seventh, and eighth days of the disease, and then, after the crisis came, a sudden and very rapid loss of weight, the loss increasing until the eighth day after the crisis. The increase in weight may have been due to the developing exudate, to the accompanying pleural exudate, or to retention of water. The loss of weight after the crisis continued to increase for a period, even after the appetite had returned and the amount of food taken had been materially increased.

The differences in the weight curves observed suggest strongly that Leyden is correct in his idea that the course of the body weight in these diseases is not determined by the resorption powers of the digestive tract, but by the nature of the infective process.

Appearance of Roseola in Typhoid. Schlesinger,[1] in an article upon the clinical phenomena of typhoid fever as it appears in Vienna, speaks of the fact that roseola sometimes does not appear until late in the course of the disease, sometimes not until as late as the fourth week, or even until the first days of convalescence. When the eruption appears as late as this, relapse occurs, as a rule.

He also points out that the presence of the Widal reaction at a time when there is no eruption speaks against the suggestion that roseola has some relation to the agglutination of the bacilli, emboli of agglutinated typhoid bacilli.

Relapses in Typhoid. Koplik and Heiman,[2] upon the basis of 24 relapses among 160 cases of typhoid fever in children, report their observations and point out certain features of importance. The percentage of relapses is higher in children than in adults—15 per cent. in this series, a figure closely resembling that of 16.4 per cent. observed by Henoch, but it is lower than 19.5 per cent. reported by Curschmann and the 19.1 per cent. observed in Leipsic.

Numerous authors have stated that the spleen remains large in cases liable to relapse, but such was found the case in but 11 of this series of 24.

Counting the double and triple cases, there were 30 relapses, the longest of which was thirty-seven days, the shortest six, and the average thirteen.

The temperature curve in general resembles that of the original attack, except that rise may be abrupt, as it was in 7 of these cases, and the fall is less gradual, fall by lysis being rare.

Double and triple relapses are more apt to follow severe cases. The pulse is less apt to be slow and dicrotic, as it is in adults. The spleen was enlarged in all; roseola present in 73.3 per cent.; the Widal was positive in all but 1; the blood often showed a leukopenia.

The cause of the relapses remains unknown; 14 of the cases had not received other than solid food, while 10 had received eggs, strained gruels, and milk toast.

[1] Wiener klinische Wochenschrift, 1907, 494.
[2] Archives of Pediatrics, 1907, xxiv, 1.

PERFORATION IN TYPHOID FEVER. The subject of perforating typhoid ulcers in typhoid fever is always interesting, and each year sees material increase in the literature of the subject, although it is clear that only rarely can a new fact be added. Among the articles of this year is a series by Harte,[1] Shattuck, Scudder, and Cobb, in which certain important points are accentuated.

One thing which is not yet as generally appreciated as it should be is the frequency with which perforation occurs. It has been estimated that 16,000 die annually in the United States from this cause, and Harte states that from January, 1903, to March, 1907, there were 3805 deaths from typhoid fever in Philadelphia, and that at least one-third of these deaths were due to perforation. This is probably an overestimate, and the probable figure suggested by McCrae of 1 in 8 deaths, seems more likely. But no matter whether we say one-eighth or one-third, the frequency and importance of perforation is very great. The diagnosis is sometimes difficult, for all of the symptoms caused by perforation may be due to a variety of other causes, but the combination of pain, rigidity, collapse symptoms, and vomiting should lead to operation, the dangers of which are far less than those to which the patient is exposed by delay.

Scudder points out a considerable variety of conditions which have been mistaken for typhoid perforation, such as gastritis, enterocolitis, hemorrhage of Zenker's degeneration of the abdominal muscles, distended urinary bladder, cholecystitis, infected ovarian cysts, strangulation of Meckel's diverticulum, rupture of an infected mesenteric gland, femoral and iliac thrombosis. It should be noted that a considerable proportion of these errors are not as important as they seem, for the condition found needs surgical interference as urgently as the suspected typhoid perforation.

PLEURISY IN TYPHOID FEVER. Barjou and Lesieur[2] report an instance of pleurisy developing during the course of a moderately severe but typical typhoid, and point out the importance of correctly recognizing the etiological factor, and of determining whether the pleurisy is due to the typhoid bacillus, to the tubercle bacillus, or to some other less definite cause. In answering the question the laboratory methods are of major importance. In the case reported, the fluid contained polynuclear leukocytes, and later, lymphocytes. It was sterile both by culture and by inoculation of animals. It had distinct bactericidal powers over the typhoid bacillus, and finally showed an agglutinating power almost equal to that of the blood.

HEMATURIA DUE TO TYPHOID INFECTION. Napier and Buchanan[3] report an interesting instance of a fortunately infrequent form of typhoid fever. The patient, an adult male, had a series of symptoms, regarded

[1] Boston Medical and Surgical Journal, 1907.
[2] Lyon Médical, December, 1906, cvii.
[3] Glasgow Medical Journal, December, 1906.

by him as a cold in the head, for three days, when a measly eruption appeared on face and arms. This continued for two days, and then the urine became red in color. This persisted for two days, to disappear for several days. When first seen the urine was dark, reddish brown, and showed blood in large amounts, with granular, hyaline, and epithelial casts. Bacteria were present in the freshly passed urine, and proved to be the Bacillus typhosus.

The case was, up to this time, regarded as an acute nephritis, without edema. The later course was that of a prolonged typhoid. The blood continued in the urine for five months. The patient eventually recovered completely.

NEPHRITIS IN TYPHOID FEVER. Rolly[1] makes a brief report upon nephritis as observed in 1700 typhoid cases in the Leipsic clinic; 26 of these showed a nephritis, in all hemorrhagic in type; 13 died, 12 recovered, and in 1 the nephritis became chronic. In 15 instances the nephritis began during the first fourteen days of the typhoid, and 5 of these were noted even as early as the first week. The clinical course of the typhoid is not influenced by the complicating nephritis, but the prognosis is worse. Only rarely does edema and uremia appear. In 4 cases in which the blood pressure was measured it was not found raised. High fever and the nephritis were usually coincidental in their appearance. Only once did the albumin in the urine decrease as the temperature fell. The urinary sediment showed epithelial, granular, and blood casts, with free renal epithelium, red and white blood cells.

On autopsy, one found, in addition to the findings usual in typhoid fever, that there was a more or less developed glomerular nephritis, and in some instances there were relatively little changes in the kidneys, in spite of the large amount of epithelium and epithelial casts found in the urine.

TYPHOID CYSTITIS. Although the escape of the typhoid bacillus from the body, through the urine, is so common, the instances in which they implant themselves upon the mucous membrane of the urinary tract is exceptional. Schaedel[2] reports 2 instances of cystitis typhosa. This complication is, fortunately, a rare one, as is illustrated by the fact that Curschmann, in 1900, reported 3 cases from the clinic in Leipsic, and no other cases were observed there until the end of 1905. Cases have also been reported by Melchior, Gwyn, and others since 1892, although instances are recorded in older literature under other names.

The cystitis usually comes on late in the course of the typhoid or in the beginning of the convalescence. Sex has no particular influence as a predisposing factor. Retention of urine, not infrequently seen in typhoid fever, is a factor in the causation of cystitis.

[1] Münchener medizinische Wochenschrift, 1907, liv, 193.

[2] Mitteilungen aus den Grenzgebieten der Med. und Chir., 1906, xvi, 619.

The symptoms do not differ from those ordinarily presented by a cystitis, and the prognosis is favorable, except when the typhoid itself is so severe as to make life uncertain.

The treatment consists in the use of such drugs as urotropin, and, in some cases, irrigation of the bladder with appropriate antiseptic solutions.

Stadler[1] also reports 3 cases of typhoid infection of the bladder, and considers that marked muscular weakness and enteroptosis are contributory causes. One might also add the probability that such infection might occur in women with a relaxed pelvic floor.

ORCHITIS IN TYPHOID FEVER. Kinnicutt,[2] in 1901, published a report upon orchitis as a complication of typhoid fever, and was able to collect but 53 cases. To this number Gwyn adds 2 personal cases and notes 2 others added to literature since Kinnicutt's paper. The 2 cases reported presented widely different symptoms and course, probably because of the different pathological processes involved. One, due to venous thrombosis, was not accompanied by pain in the testicle nor by constitutional disturbances, and went on to easy resolution, while the other, after great pain and marked constitutional symptoms, ended in suppuration, and was due to direct typhoid infection.

HEMIPLEGIA DEVELOPING IN THE COURSE OF TYPHOID FEVER. Smithies is led, by a case of hemiplegia developing in the course of typhoid fever, to a review of the cases so far reported. He presents a table of 43 cases.

Of 32 cases in which sex is mentioned, 23 are males and 9 are females. The age range is from under five to over thirty. Of associated conditions which might have some bearing, syphilis is mentioned in 2 cases, including the one added by Smithies. Cardiac lesions were not frequent. In the case added there was, at times, a soft blowing murmur at the apex and considerable irregularity in rhythm, with marked dicrotism but no persistence of cardiac dilatation or incompetence.

Aphasia occurred in 26 of 32 cases in which disturbances of speech were mentioned.

The time of onset varied widely. Among 30 cases in which details are given, only 1 case occurred during the first week, 8 during the second, 8 during the third, and 2 during the fourth. Others came on during convalescence, 1 as late as the eighth month.

The mode of onset varied. In 10 cases the paralysis was preceded by convulsions. In 4 these came on suddenly and violently. There was usually unconsciousness associated with the convulsions. In several instances severe headache preceded the onset of the paralysis.

Of the 31 cases in which the side affected is mentioned, the paralysis was right twenty-one times and left ten times.

Thrombosis or embolism was the cause of the symptoms in the cases

[1] Münchener medizinische Wochenschrift, 1907, liv, 100.

[2] American Medicine, 1907, ii, 75.

posted. Six of the patients died and 12 recovered completely. In the great majority of the other cases the paralysis usually gradually improved.

LIVER ABSCESS COMPLICATING TYPHOID. Venema and Grünberg[1] report an interesting example of one of the rare complications of typhoid fever, namely, a liver abscess. When one recalls the relatively frequent suppurative complications of this disease, one cannot but be surprised at the fact that pus formation in the liver is so uncommon that in 1890 Romberg was able to collect but 19 instances in literature, and only 5 of these appealed to him as having been carefully observed. Since then cases have been added by Wendel, Sheldon, Swain, Sennert, and others, so that there are now approximately 26 recorded cases.

The fact that one of the common causes of abscess of the liver is a disease associated with ulceration of the intestines, the dysentery tends also to suggest to one that abscesses in the liver would be a common, instead of a rare, complication. Another fact which carries with it the same suggestion is the frequency with which the biliary passages are infected by the typhoid bacillus.

Theoretically, one can conceive of three ways in which the abscess in the liver might arise:

1. As a result of ulceration of the bile passages.
2. Because of a suppurative thrombophlebitis of the mesenteaic veins, subsequent to the ulcers in the intestines.
3. As a result of a general septicemia.

To these three a fourth has been added by Sennert, who, in 1906, reported a case of typhoid liver abscess following trauma.

So far but 6 cases have received careful bacteriological study. In all of these the typhoid bacilli were found in the pus, sometimes pure, but usually in association with cocci.

The clinical picture consists of a combination of the general symptoms usually accompanying abscess formation, whatever its site, with local phenomena attracting attention to the liver.

The prognosis is grave, but 4 of the 6 cases studied bacteriologically—in other words, 4 of the 6 cases seen in the last ten years—recovered after surgical treatment, which, it is needless to say, is the only rational treatment.

[1] Berliner klinische Wochenschrift, 1907, 333.

DISEASES OF CHILDREN.

By FLOYD M. CRANDALL, M.D.

The pediatric literature of the past year has apparently been about the same in amount as that of recent previous years, but no strong drift is to be noted in any particular direction. In an extended address given at the Harvard Medical School, Rotch[1] presents an admirable review of disease and the prevention of disease in early life. He considers first those congenital conditions which are to be prevented by the treatment of parents rather than the child, but draws attention to the importance of recognizing the probable occurrence of these conditions and combating them in the infant from its earliest days. He then turns his attention to the acquired diseases, certain of which may result from the mismanagement of a normal infant. Those who care for infants may ignorantly produce disease by forcing the functions of an early period of development to undertake the duties of a later period, and by overtaxing undeveloped functions. This may result from too prolonged confinement in school and forcing an undeveloped brain to assume a grade of study beyond its normal capacity.

The reverse of this is seen where the functions are not brought into use when ready to be used and may thus be called disease arising from unwise and ignorant caution. As examples of this class may be mentioned: (1) Fear on the part of the caretaker to allow the infant to use its legs when they are ready and ought to be used; (2) overprotection from cool, fresh air in the nursery and sleeping-room; (3) keeping in the house too much; (4) keeping from becoming accustomed to seeing people and to a moderate amount of sound; (5) keeping on with breast milk, or with a properly modified cow's milk, after about the twelfth month, a time when, normally, other food is indicated, owing to the functions of digestion having been developed to such a degree that they require a change of quality of food; in other words, when a function is ready to be used, it should be used, or harm may follow.

Another and most serious class of acquired diseases are the diseases of nutrition. In these conditions the manifest ignoring of nature's physiological teaching has struck at the very centres of the infant's tissues. So far as we know the cause of this nutritive class of disease is almost entirely errors in feeding. This includes not only a failure to adapt the food to the period of development of the digestive organs, but

[1] Monthly Encyclopedia of Practical Medicine, May and June, 1907.

the cases where parents and physicians consider more the age of the infant than its individual stage of development. The importance of studying the individual infant is very great. This also means that, so far as the food is concerned, we should consider not alone what food would usually be indicated at a certain age, but should make the food fit the individual's stage of development.

These diseases of nutrition play a great role, especially in the first two years of life. Although they may cause death in certain instances, the danger lies mostly in making the individual vulnerable to other diseases which, according to their greater or less virulence, may lead to irreparable crippling and even death. The representative three diseases of this class in infancy are rachitis, infantile scurvy, and infantile atrophy. They may all be prevented by intelligent feeding and good hygiene. They all can be cured if recognized and properly treated in their early stages. The first two of these diseases are characterized by a definite pathology, the third by a notable absence of our knowledge in regard to its pathology. This group of diseases is assuming a more and more important position among the morbid conditions belonging to the early years of life, as it is becoming evident that they are more far-reaching in their effects and influence to a much greater degree all the diseases of early life than in former years was recognized as possible. Thus the prognosis of all the diseases which have a definitely determined etiology is markedly graver when they occur in an infant who is suffering from one of these general disturbances of nutrition. In this way both rachitis and infantile atrophy have come to play a great and important role in our study of infantile diseases and in their therapeutics. When we consider the high mortality of these diseases when uncomplicated, and the greatly increased mortality of all diseases which are complicated by them, and when we recognize that they are closely associated with improper food and hygiene, it becomes very evident that the proper therapeutic management of this group of diseases is of very great importance, and should demand special study and care in feeding during the early months and years of life. There is no doubt that if less attention were paid to the use of drugs in the various non-organic disturbances of the gastro-enteric tract during early infancy, and that if a more enlightened method of feeding were adopted by laymen and physicians, it would be possible to eradicate this entire group from its place among the pathological conditions of early life, and thousands of lives might easily be saved where they are now recklessly thrown away.

Temperature of Breast-fed Infants. Observations on the temperature of breast-fed infants are reported by Nobécourt and Merklen,[1] who found a remarkable uniformity of temperature. When the children are well, the variations were not greater than two- or three-tenths of one degree. Gastro-intestinal disturbance at once caused fluctuations.

[1] Revue Mens. des Malad. de l'Enf., July, 1907.

The authors believe that this peculiar uniformity of temperature has no reference to feeding or to light, as has recently been suggested. According to their observations, the temperature remained the same during the night. At the time that artificial food began to be added to the diet, about the end of the first year, the temperature began to fluctuate. The authors assert that the fluctuations were in proportion to the activity of the individual child, and they believe that the peculiar uniformity of temperature in the breast-fed infants is chiefly due to lack of activity.

Asphyxia of the Newborn. The usual number of reports of new methods of relieving asphyxia of newborn infants have not appeared during the last year. Only one decided innovation is reported, and that is not commended by its author, Offergeld.[1] Oxygen was injected from the ordinary tank into the central umbilical vein. The pressure of the oxygen in the tank was sufficient to force it into the vein. This operation was performed upon twelve infants. Three of the children lived. Three died of acute dilatation of the heart, due perhaps to the treatment. While the author regards Schultz's method of swinging as possessing certain elements of danger, he is inclined to adhere to the method of alternating hot and cold baths with artificial respiration, or to Ahlfeld's method of artificial respiration in conjunction with prolonged warm baths. By this method children sometimes recover after an hour of trial. The subject is considered in an exhaustive article by I. L. Hill,[2] who proposes a method of resuscitation by the combined use of artificial respiration and tongue traction, the body heat being carefully maintained.

Hernia in the Newborn. Three cases of congenital umbilical hernia are reported by Yates and Davis,[3] in which operation was performed, respectively, at four hours, sixteen hours, and one hour after birth. One patient died four hours after operation, and one five days after operation. A case of congenital umbilical hernia is reported by S. S. Wilson,[4] in which the child was operated on when three hours old, and made a good recovery. The sac of the hernia contained the entire small intestine and the cecum. A case of congenital lumbar hernia at the triangle of Pettit is reported by Dowd,[5] in which successful operation was performed when the child was three and one-half years old. The sac of the hernia was distinct and contained the colon and appendix.

Hemorrhage of the Newborn. The occurrence of hemorrhage in newborn infants is not a condition of great infrequency, and is always of very grave import. For some time it has been known that spontaneous

[1] Zentralblatt f. Gynäkologie, December 29, 1906.
[2] New York Medical Journal, November 9, 1907.
[3] American Medicine, January, 1907.
[4] Western Medical Review, April, 1907.
[5] Annals of Surgery, February, 1907.

hemorrhages from the mucous surfaces in newborn infants are due to changes in the blood. It is also probable that the radical change in the circulation produced by ligating the cord is a factor in its causation. Extended study of the subject has been made by Lequeux.[1] Among 2162 obstetric cases in the Saint Antoine Hospital, in 1905, the hemorrhagic tendency was observed in 52 per cent. of the infants who died soon after birth. A large majority were boys. The writer is convinced that infection was the underlying cause, for either streptococci, staphylococci, or colon bacilli was found. The infection was apparently of postpartum origin in most cases. In fact, epidemics of this condition have been reported. Of the various organs involved, the liver is affected most frequently, and usually most severely, and the spleen is the next organ most commonly involved. The bacterial transmission is commonly through the umbilicus or the intestinal tract, but it may apparently occur through the placenta or at the time of birth. It seems probable that the condition is more liable to occur in the children of mothers who are suffering from some form of Bright's disease, alcoholism, lead poisoning, or some other chronic intoxication. An unusual case of hemorrhage from the vaginal mucous membrane alone in an infant three days old is reported by Drake.[2] There was no bleeding from the stump or other locality.

Hematuria in Children. In an editorial article on this subject[3] the writer asserts that hematuria of rheumatic nature is possible. There are instances of slight renal lesions where congestion plays the principal part. It is in influenza that these accidents are most frequently observed, but they are also met with in rheumatism, in sore throat, and in the so-called glandular fever. Renal congestion, without nephritis, properly speaking, is not infrequent, but there are cases where tuberculous disease is the cause. Hematuria may occur at the very beginning of the process. The loss of blood alone is not common, but far more frequently the urine is purulent at the same time.

Essential hematuria may also be observed in children, or at least, if not essential, it seems to occur without any apparent cause. Cases have been met with in purpura, and the albuminuria disappeared along with the loss of blood. Renault has reported such cases, although albumin was wanting. In these various conditions it may he admitted that there is renal congestion, without any permanent lesion, but the hematuria may also be due to nephritis, appearing with the same clinical aspects. In this case it differs from the other types, because the albuminuria is more or less persistent even when all trace of blood has disappeared from the urine. The hematuria is then only a symptom, while the nephritis is the cause. Instances of acute nephritis occurring

[1] L'Obstetrique, Nos. 2 and 4, 1906.

[2] Journal American Medical Association, August 31, 1907.

[3] New York Medical Journal, March 2, 1907.

during whooping-cough have been recorded. Under these circumstances the liver should be carefully examined, because in the more serious forms of nephritis it is frequently increased in size. Nephritis may also arise under very special circumstances, as in the case of scabies. This has been described, especially when secondary infections arose. Sometimes the drugs used for the treatment of the skin infection may give rise to the renal lesion.

To sum up, it may be said, without referring to calculous hematuria, which has its own special symptomatology, that purely congestive hematuria may be met in children, the prognosis of which is usually excellent. Cupping over the renal region, and calcium chloride in daily amounts of 15 grains, with a milk diet, are usually sufficient to cause this symptom to disappear rapidly. But it may also be indicative of a nephritis which is very superficial and rapidly disappears, although the prognosis is more serious than in the former case. The persistence of albuminuria after the blood has disappeared from the urine is the distinguishing sign of nephritis.

A case of hematuria due to infantile scurvy is reported by Parkinson.[1] No other symptom of the disease was evident until the closest examination was made. The cause of this condition was, of course, quite different from that of hematuria during the first week of life. The same author also reports a case due to congenital renal tumor. In hematuria following scarlet fever, Parkinson recommends dry cupping over each kidney as superior to any other treatment.

Convulsions in Infancy. In an extended paper on the etiology of convulsions in infancy and childhood, McIlrath[2] reports his observation on 250 children in whom convulsions occurred. The greater number of seizures occurred during the first year of life, and but few after the third year. The author is convinced that the predisposing causes are more important than the exciting causes. The normal children of healthy parents rarely have convulsions, for the principal predisposing cause is an inherited neurotic taint. A neurotic element may usually be discovered if the family history is examined. In the author's cases a history of hereditary neuropathic taint was found in 143 cases, and rickets in 94, both causes being present in 25 cases. The following exciting causes were found: Abnormalities of labor, 10; cerebral paralysis, 8; infantile paralysis, 2; congenital syphilis, 6; hydrocephalus, 2; meningitis, 1; trauma, 9; insolation, 1; dentition, 3; gastro-intestinal disorders, 108; overloading stomach or improper food, 7; reflex irritations from various sources, 20; onset of measles, 7; onset of pneumonia, 13; onset of rheumatic fever, 1; whooping-cough, 7; during measles or pneumonia, 4; following an acute fever, 9; jaundice, 3; mental deficiency, 5; idiopathic, 24.

[1] British Journal of Children's Diseases, February, 1907.

[2] Medical Chronicle, November and December, 1906, and January, 1907.

It is seen that a neurotic taint and rickets play a very important part in the etiology of convulsions, but a small proportion can be ascribed to organic disease of the brain or injuries at birth. The most common cause of convulsions in the first two months of life is reflex irritation from the alimentary tract. Dentition is rarely a cause of convulsions, and only when some predisposing cause exists. Convulsions are by no means as frequent as supposed at the onset of acute fevers. They are more common at the outset of pneumonia than at the onset of measles. When they do occur there is usually some predisposing cause present. Convulsions are by no means frequent in whooping-cough when no predisposing cause exists and no complications occur. In early life they may be the first sign of epilepsy, or may give rise to that condition in later life, and this is more likely to occur when there is no obvious cause for the attack.

The subsequent history of 64 children who suffered from convulsions is traced by Thiemich and Birk.[1] Only 2 of these cases were breast-fed, and in 54 per cent. predisposition was discovered. Two-thirds of the children were found later to be below the average of intelligence or morals, but few of the eclamptic infants developed into normal children. It must be said that these figures are startling. Such serious results might be apprehended for children who had repeated convulsions, but we see in this country many children who have suffered one or two convulsions during the first year who show no subsequent impairment.

Laryngismus Stridulus in Young Infants. A number of cases of this disease are reported by Eustace Smith[2] as occurring during the first month of life. There was one feature common to every case, namely, extreme obstruction resulting from adenoid growth and postnasal catarrh. In many cases in these young infants these spasmodic movements are not confined to the larynx, but involve the surrounding tissues. As in older children, the amount of distress varies from an occasional crow to severe and prolonged spasms, in which the breathing ceases completely and the face assumes a slate color. The infant often seems to be in an extremely dangerous condition and on the point of suffocation. The first point in treatment consists in removing the cause, and this, Smith believes, will be found in the nasopharynx. When the case is mild, a few drops of a solution of resorcin in normal saline solution, one or two grains to the ounce, instilled into the nostrils several times a day will often stop the crowing. In the more severe cases the nasopharynx must be curetted, after which local applications must be made. This should be done without unnecessary delay. During the paroxysm the tongue should be hooked forward by the fingers, or it should be grasped with tongue forceps, and traction should be made.

[1] Jahrbuch f. Kinderheilkunde, lxv, Nr. 27, 1907

[2] British Medical Journal, July 20, 1907.

Birth Palsy. The subject of brachial birth palsy, with especial reference to treatment, is discussed by Alfred S. Taylor[1] in an extended illustrated article. The condition is due to overstretching of the nerve roots during delivery of the child, which results in rupture of the sheath, fibers, and vessels of the nerves. From cicatrization of the resulting hemorrhage and torn sheath there results a permanent obstruction to the transmission of nerve impulses. These cicatrices may be single or multiple. The only way to reëstablish nerve conduction is to excise the cicatricial area and do an end-to-end suture of the nerves. If the operation is delayed too long, there may result impaired development of the extremity, contractures of muscles and ligaments, and atypical shapes of the joint ends of the bone. These conditions cause the characteristic deformity and render recovery after operation exceedingly slow. The older the patient the slower and more incomplete is the recovery. Early operation is, therefore, indicated. Taylor believes that from six to twelve months is the most opportune time, as the lesion has then become well localized. Further experience, however, may suggest an earlier date. Both before and after operation deformity should be prevented, as far as possible, by the systematic use of massage and suitable movements. The damage to the nerve roots in the order of severity is from above downward. The suprascapular, which is always damaged, controls the important group of external rotators of the humerus. At the operation, therefore, it should be carefully sutured to a proximal nerve stump. Some additional palsy frequently follows the operation, but recovery soon takes place. After the operation, improved nutrition and growth of the extremity occurs, and, as a result, increased range and power of motion.

Cases are frequently reported as congenital dislocation of the shoulder, with one or another type of treatment, which, from the description, must be brachial birth palsy, complicated by posterior dislocations of the shoulder. This dislocation is due to the paralysis of the external rotators plus the contracture of the pectoralis major and subscapularis muscles. This dislocation should not distract one's attention from the essential nerve lesion.

In treating of the pathology of this condition, as developed by the study of the excised specimens from six cases of birth palsy, Prout[2] shows that the possible sequence of events in the production of the permanent palsy is as follows: rupture of the perineural sheath immediately surrounding the nerve bundles and incidental hemorrhage from the torn vessel belonging to it. Following this rupture of the perineural sheath, the nerve fibers themselves become torn, and the consequent hemorrhage interposes a blood clot between the torn ends of the nerve fibers. In some instances, also, there is a buckling inward of the torn perineural sheath, which thus interposes between the torn ends of the nerve fibers

[1] Journal American Medical Association, January 12, 1907. [2] Ibid.

a mass of living connective tissue, which, together with the hemorrhage already mentioned, effectually prevents the process of repair.

Dentition. In an extended editorial article[1] the *relation of the teeth to mouth breathing* is considered. It is asserted that one of the evil effects of mouth breathing in young children is malocclusion of the teeth. Occlusion is the term used by dentists to denote the relation which the teeth of one jaw sustain to those of the other when the teeth are brought into contact. Normal occlusion may be defined as the accurate fitting of the teeth of one jaw with the teeth of the other when the jaws are closed. This malocclusion is a result of mouth breathing, which has received but little attention from medical men, though it is obviously of the greatest importance. The form which characterizes the mouth breather is posterior occlusion of the lower jaw, depression of the bicuspids and molars in their alveoli, narrowing of the arch, while the incisors and canines have the labial inclination. In the superior maxillæ the arch is correspondingly narrow; the molars and bicuspids are depressed; the incisors and canines are elongated and protruding from the mouth, frequently making closure of the lips impossible. In the temporary teeth the effect is less marked. The most noticeable effect is slight posterior occlusion of the lower jaw, slight rotation of the incisors, and undeveloped jaws. An examination of the mouth will reveal considerable elevation of the palate, lack of development of the alveoli, especially marked in the incisal region of the upper jaw, and noticeable in facial disfigurement. To attempt the correction of malocclusion without the removal of the cause and the establishment of normal breathing is but to invite failure. Obstruction in the nasopharynx must be removed. Treatment for malocclusion may then be commenced. It may be laid down as a general principle that the extraction of teeth is contraindicated. Circumstances may arise making it advisable, but it should only be done after most careful consideration. Perfect occlusion can never be obtained, nor can complete development of the facial bones and nasal passages, where extraction has been practised.

Nutrition as a factor in tooth development is the subject of a paper by Lederer.[2] He strongly urges the importance of maintaining the nutrition and providing for the child the proper nutriment. It is the observation of every physician that the teeth show most markedly impairment of nutrition. Delayed and irregular dentition is one of the most marked manifestations of rickets. From the standpoint of the dentist, Lederer insists on the importance of breast feeding and of supplying the best possible food when weaning is necessary. He especially disapproves the too early and extensive use of starchy food.

Anorexia Nervosa in Children. Under this title Forchheimer[3] presents a paper of decided interest upon those children who persistently refuse to

[1] Archives of Pediatrics, January, 1907. [2] Medical Record, September 14, 1907.
[3] New York Medical Journal, September 21, 1907.

eat. For several years past cases have been reported under this title. In 1895 Marshall reported a fatal case, and in 1896 Gull did likewise. It has been looked upon by many as an hysteria, and as a neurosis. The patients usually take no food, and, as the cases are found in the young, they are often the result of faulty training, and the condition is brought about by pampering. Most of the children are allowed to grow up of their own accord, and have no restrictions put upon them. The condition is purely a psychic one, and we must agree that we are dealing with infantile hysteria. It may be cured if removal of the cause can be effected. We must discipline thought and action until our new instruction takes root as a fixed idea. We must employ the art of mental suggestion in these cases and study the patient mentally and physically. Drive the child straight, as with a bit; keep it on in one direction. Drugs are sometimes of avail, and electricity and hydrotherapeutics are especially valuable. A good nurse who understands children is invaluable. Much good may be obtained from a complete change of surroundings. Send the patient to a good institution or to visit proper relatives or strangers. The feeding is the controlling factor, the object being to make the patients gain weight. Lavage should only be resorted to as a last resort.

The Significance of Albumin and Casts in the Urine of Infants. A short but excellent article on this subject is contributed by Sondern,[1] who calls particular attention to the fact that in children even more than in adults the occurrence of albumin in the urine, alone or associated with casts, is not the absolute indication of nephritis once believed, as its presence does not necessarily indicate an inflammatory lesion of the kidney. While the occurrence of a so-called physiological albuminuria is open to question, not only an inflammation of the renal parenchyma in its broadest sense, but also comparatively slight disturbances in circulation, in innervation, or in the quality of blood, may occasion the passage of larger or smaller amounts of albumin in the urine, with or without casts. The differential diagnosis is occasionally not immediately possible, and demands repeated examination of the urine and close clinical observation. Sudden changes of temperature, cold baths, violent exercise, sudden changes in altitude, fright, extreme grief, surgical or traumatic shock—anything that suddenly increases or lowers blood pressure—may cause transitory albuminuria, due to changes in circulation or innervation. In these changes the diagnosis is simple, on account of the short duration of the condition and the easy detection of the causative factor in the clinical history. When the functional albuminuria is due to changes in the blood offered the kidney for the exercise of its function, or to circulatory disturbances, due to the heart or other organs, the condition is not transitory in the same sense, and these are the cases in which the differential diagnosis between functional and nephritic albu-

[1] Archives of Pediatrics, February, 1907.

minuria becomes difficult. In them the mere appearance of albumin and casts is not sufficient, and repeated complete analytical results, combined with careful clinical observation, are always necessary, and not invariably successful at that.

Cases are reported by Grulee[1] in which an early nephritis in the child would seem to be explained by nephritis and eclampsia in the mother. Though we cannot draw too far-reaching conclusions from the few cases reviewed, we can, at least, say that a certain percentage of children born of eclamptic mothers come into the world with the kidney functions impaired. Though a large number of these children are born dead and another portion dies soon after birth, still a certain number survive the immediate postnatal period. It seems to be justifiable to regard eclampsia in the mother as one of the causes of so-called "idiopathic" nephritis which we sometimes encounter in children.

Pyelitis. A series of cases of pyelitis in infancy and childhood is reported[2] by Fischer, who asserts that there may be three groups of symptoms, as follows: (1) Fever, intermittent in character, progressive emaciation, and constipation or coprostasis; (2) bed-wetting and pains, evinced by crying while urinating, passing of small quantities of urine at a time, as though afraid to pass more because of the pain; absence of fever throughout the whole course of the disease. (3) Distinct digestive disturbances, mostly marked by the passage of scybalous masses, and feces intermingled with shreds of membrane. There is marked anorexia, but fever is very rarely present.

In discussing these cases, Kerley[3] said that his cases differed from those reported by Fischer, probably because they were young children. All were under eighteen months of age, and all were girls. There was marked severity of onset, in three by chills, and the excursions of temperature were wide. In two cases the diagnosis was made simply by examination of the urine; nothing else could be discovered to account for the illness. In all cases the colon bacillus was found. In my own experience in pyelitis without cystitis, pain and tenesmus have not been present. In a recent case in an infant of nine months but few of the symptoms mentioned by Fischer were present. The fever during the first week was high and showed but little fluctuation, and there was but little pain or tenesmus. There was no digestive disturbance and the appetite was normal. The condition of the urine, however, made the diagnosis unmistakable. With all authorities I would agree in urging the importance of examining the urine in every case of obscure fever, whether of adult, child, or young infant. Pyelitis is not particularly infrequent during the first year.

In the treatment Fischer gave water freely, and a diet consisting of milk diluted with alkaline waters, cereals, fruits, and gelatin puddings.

[1] Archives of Pediatrics, July, 1907.

[2] Ibid., June, 1907.

[3] Ibid

Meat and eggs were excluded during the acute stage. Among the drugs used were urotropin, phosphate of soda, bicarbonate of potash, and benzoate of soda.

Pigmented Spots in the Sacral Region of Infants. At least two interesting papers have appeared recently upon these peculiar markings. The first is by Herrman,[1] of New York, the observations being made upon white and negro infants. He asserts that but one paper has been published in this country upon this subject, that of Ashmead,[2] who describes the spots as they occur in dark-skinned races, but makes no reference to them as they occur in white infants, in whom the spots are comparatively rare. Herrman examined about 2000 infants and found the spots present in 6, all of dark complexion. Five were of Russian parentage, 1 Italian. In negro infants the spots were much more common. In a series examined at the Vanderbilt clinic the spots were distinct on 25 per cent. They were more easily seen in those whose parents were not particularly dark-skinned. These spots are more frequently seen in the sacral, lumbar, and gluteal region, occasionally on the upper part of the back, shoulders, and extensor surfaces of the extremities, rarely on the face. In white infants there is more commonly one spot; in negroes, several. They vary in size from that of a dime to that of the palm of the hand; they are circular, elliptical, or irregular in outline; often two large spots are joined together by a narrower portion. They are not raised above the level of the skin, are not covered by a growth of hair, and do not show any indication of bloodvessel formation. By putting the skin on the stretch, the part is blanched and the outline of the spots becomes more distinct, though their color does not change. In white infants their color is a grayish blue to slate. They look not unlike tattoo marks, and are really produced in a somewhat similar manner. In negro infants the spots present a more greenish tint, as a rule.

The second paper, that of Brennermann,[3] of Chicago, deals exhaustively with the microscopic and pathological aspects of the subject. He refers to the fact that so little has been said upon it by American anthropologists and physicians, although so great a wealth of material is at their disposal. For centuries Japanese physicians and writers have discussed and striven to interpret the occurrence of such pigmentation in children of their race, where it forms a peculiarly striking feature.

Numerous observations of more or less scientific character have been reported by German and French writers, but it remained for a Japanese, Buntaro Adachi, working in the laboratory of the German anatomist, Schwalbe, in Strasburg, to place the whole subject on a scientific basis. In 1893 he published the results of his exhaustive study of pigmentation of the skin in man and monkeys. He had long believed that these pigment spots were not distinctively Mongolian, as taught by Baelz, and

[1] Journal of Cutaneous Diseases, May, 1907.
[2] Ibid., vol. xxiii, 1907.
[3] Ibid., June, 1907.

started out to look for the casual cells in the skin of white children. His findings led him to study pigmentation in general in man and monkeys. In both he found pigment in the epidermis and corium independent of one another, variable in amount in different races and individuals. It is the pigment found in the corium that is especially significant. This lies in two distinct layers of pigment-bearing cells. In both man and monkeys these deep-lying dark pigments appear blue on the surface, in accordance with the same law that makes black carbon appear blue in the tattoo mark.

Brennermann then goes deeply into the microscopic findings. Numerous views have been held, one of the most common being that the condition is a Mongolian characteristic. Its occurrencé in the American Indian has even been held to indicate their Mongolian descent. The view held by Adachi, that we have here to deal with a rudimentary formation, can alone explain satisfactorily these strange spots. In monkeys, epidermal and dermal pigment are formed independently and have, presumably, the same function. In man, epidermal pigment alone plays an important part, and is formed independently of that in the corium.

We must think, then, of this pigmentation as a normal human characteristic, not as a recurrence of a lost ancestral condition, *i. e.*, atavism, as suggested by Bloch, but the persistence in rudimentary form of what was once, perhaps, a more widespread and functional layer of pigment, such as exists in certain monkeys. We can no longer consider these spots as exclusive race characteristics. They are to be accorded the same value as other racial traits—color, hair, features. Their presence or absence in given cases leads to highly probable, but not positive, determination as to race or to degree of contamination. This is of especial interest to us in this country.

Enlargement of the Epitrochlear Lymph Nodes in Infants. Three hundred infants were examined by Hess, of New York, with especial reference to enlargement of these glands. Of all the superficial glands, enlargement of the epitrochlear is the most uncommon, but certain types of enlargement are so characteristic as to be of great importance. They are not difficult to palpate in infants, provided the correct method is employed. That which yields the best results consists in supporting the patient's forearm with one hand while palpating the gland with the index finger of the other. The thumb of the examining hand should rest just above the external condyle of the humerus. In this way, after some practice, the smallest gland will be felt. The only difficulties experienced are at times in distinguishing between the gland and the ulnar nerve, or in failing at first to note a gland situated unusually high, or of mistaking a supracondyloid bony spine for an enlarged gland.

Of the 300 cases examined, numerous infants were found to have one enlarged epitrochlear gland, but unless this was especially large no im-

portance was attached to it. Minute, bilaterally enlarged glands were found to be very frequent. Small, bilaterally enlarged glands were found in 26 cases. As these represented a great variety of diseases, and included only 3 cases of syphilis, little weight can be attached to such glands. Large, bilaterally enlarged glands were found, however, in only 15 cases of the 300; 6 of these were, or had been, afflicted with syphilis, and 2 of these were only seven weeks old. One of them had epitrochlear glands the size of marbles. Of the remaining 9 cases, 3 were probably syphilitic. Of the 6 remaining cases with large epitrochlear glands, 2 had tuberculosis with general glandular involvement, and 1 had furunculosis of long duration. The fact that bilateral enlargement occurs so rarely in infants, and proves of syphilitic origin in the majority of cases, is certainly a striking and important fact. This cannot be applied to older children. Among them bilaterally enlarged epitrochlear glands, whether due to local lesion or previous infectious diseases, are far more frequent, and therefore are of less importance. In their case the glands must be more pronounced in order to be given weight in the diagnosis of syphilis. However, in two brothers, six and seven years old, this was the first sign that led the writer to entertain the idea of possible syphilitic taint.

The spleen and the epitrochlear glands should always be viewed as a unit in the consideration of hereditary syphilis. The presence of an enlarged spleen, associated with bilaterally enlarged epitrochlear glands in an infant, is strong evidence of syphilis, but Hess has seen two exceptions to this rule—1 case of tuberculosis and 1 of von Jaksch's anemia. The value of mere enlargement of the spleen, unassociated with other signs, is lessened by the fact that it occurs in many other abnormal conditions. Among 155 infants not afflicted with syphilis it was palpable in 11 instances, rickets and tuberculosis constituting the main causes. To sum up the meaning of epitrochlear glandular enlargement, it would seem that its absence by no means casts doubt on the diagnosis of hereditary syphilis, but that its presence is an important diagnostic sign, which may serve for a long time as the sole landmark of a previous infection.

Mental Fatigue in Children. In this rapid age of overstimulation and overwork even the children do not escape, but show the effects in various ways, both mental and physical. Particularly in the spring one observes the results of overwork and overfatigue. In an editorial article[1] the fact is pointed out that chronic fatigue and malnutrition of the cells of the central nervous system are apt to result from the prolonged activity of the winter, accompanied, as it is, by less fresh air, less sunlight, and less outdoor exercise than during other seasons. Normal fatigue is shown in the school child by a weakening of attention and perception, loss of self-control, lessened work rate, and lengthened time of reaction

[1] Archives of Pediatrics, May, 1907.

to all stimulus. Usually more or less painful feelings accompany all effort. Within normal limits no harm results from this fatigue. If work is continued, nature asserts herself and the child falls asleep.

Signs of overfatigue are a drawn expression of the angles of the mouth, wandering eyes, headaches, disturbed sleep, perhaps night terrors, and morning irritability. There may be emaciation and perhaps hysteria or chorea. There is no concentration of attention, and memory is capricious; there is painful nervous tension and a sense of ill-being. Older children may become horribly dreamy, introspective, self-depreciative, and develop a "New England conscience." In actual practice less serious phases of mental overfatigue are the ones usually met with. In infants fretfulness, restless sleep, indigestion—all may result from being too much entertained, especially if overstimulated just before being put to bed at night. The father and the grandparents are apt to be the worst offenders in such cases. In children of kindergarten age bad temper, fretfulness, and frequently enuresis are often due to the excitement and overstrain of the kindergarten, especially if the children are the youngest in their classes. In older children anemia, headaches, morning languor, subnormal temperature, lack of ambition, and failure to gain in weight are signs that should call the physician's attention to the amount of school work being done, as compared to the amount of sleep, of fresh air, of rest, and of wholesome food, with time to eat it. With any child, if the fatigue of the day's work is not recovered from during the night's repose, too much work is being attempted for that child.

Sudden Death in Children. The inclination in recent years to attribute all sudden deaths in young children to an *hypertrophied thymus* is criticised by Cheinisse.[1] He reviews numerous cases reported in literature of so-called thymic death, and found that in many of them the thymus was not enlarged. In many no evidence of asphyxia was observed, and some of the children died while quietly asleep. Enlargement of the thymus gland was found in but 5 cases out of 15 reported by Bibert. The theory of nervous reflex as a cause of sudden death is advocated by several authorities, among them Segadelli and Distefano.[2] These authorities believe the death to be due to inhibition of the centres of respiration or circulation by some reflex cause. It is certain that sudden death in infants may result from tuberculosis, syphilis, several forms of intoxication, and the results of difficult labor or diseases of the mother. Even if enlargement of the thymus is found at autopsy, it does not necessarily follow that it was the cause of death. Unless the hypertrophy is great, and the evidence of pressure is distinct, other cause should be sought and will often be found.

Sudden death in children suffering from infectious diseases cannot be attributed to toxemia alone, since it occurs in diseases running a very

[1] Semaine Médicale, xxvii, No. 16, 1907. [2] Ibid.

mild course, as well as those running a severe one. Czerny is quoted[1] as holding that sudden death under such conditions is due to anomalies of innervation of the vessels and heart and to previous overfeeding of the child. He usually saw it in children of families of a nervous temperament, or in children who, before they became ill, were considered nervous. A latent tetany can make itself manifest through some infection, and what holds good for this disease also holds good for other anomalies of the nervous system, especially those affecting the innervation of the circulatory apparatus. Czerny also noticed what seems to be of importance, that children who died suddenly were usually fat. At autopsy they often showed nothing but a *status lymphaticus*, to which the sudden death is attributed by many observers. Czerny, however, holds that this view is wrong, as, in his experience, based upon observations of many epidemics of various infectious diseases, these children were usually overfed, and it is the overfeeding which, according to him, causes the sudden death.

Some of the conclusions expressed by these authors seem to ignore the fact that enlargement of the thymus rarely if ever occurs without other pathological conditions. It is one of the manifestations of the *status lymphaticus*. Other abnormal manifestations of that state are described in the following pages, and unquestionably are factors in the causation of sudden death.

Status Lymphaticus. For three-quarters of a century literature has been filled with discussions as to the significance of the enlarged thymus. In the first half of the last century, due largely to the teachings of Kopp, the theory of etiological relationship of hypertrophy of the thymus and laryngospasm gained wide credence. In 1858, Friedleben's monograph on the thymus, based upon exhaustive anatomical studies, appeared. Friedleben absolutely denied the possibility of laryngospasm by an hypertrophied thymus, and even went so far as to deny the possibility of a thymic asthma. For many years his views were accepted as correct. But while it was everywhere admitted that laryngospasm and enlarged thymus had nothing to do with each other, anatomical studies by such authorities as Cohnheim and Virchow, and clinical observations by careful men, were published in great numbers, showing not only that dyspnea from enlarged thymus is a possibility, but that true thymic asthma does actually occur. The discussion of the relationship of enlarged thymus and sudden death became very active. To explain these cases of so-called thymic death, various theories based on clinical, anatomical, or experimental studies were advanced. The possibility of such thymic death by direct pressure on the trachea, with resulting asphyxia, by compression of the large vessels at the base of the heart, or of pressure on mediastinal nerves, was emphatically proclaimed, and the claims were apparently substantiated by anatomical findings. On the

[1] Editorial, Medical Record, August 24, 1907.

other hand, these theories were as vigorously denied by other observers, whose reasoning and evidence seemed hardly less faulty.

Friedlander,[1] of Cincinnati, after reviewing these various theories, discusses the work of Paltauf, publishd in 1889, who came to the conclusion that enlargement of the thymus constitutes but one manifestation of an abnormal constitutional state. He found that in his cases of sudden death, without apparent cause, there was not only an enlarged thymus, but in addition a hyperplasia of the entire lymphoid apparatus. He found enlargement of the lymph nodes in various parts of the body, of the faucial tonsils, of the lymph follicles at the base of the tongue, of the intestinal follicles, together with enlargement of the spleen and hypertrophy of its follicles. In addition to these changes in the lymphoid system there was a characteristic change in the circulatory system. The aorta, as well as the smaller arteries, were smaller and thinner than normal, so there was real hyperplasia of the entire arterial system. In some of the cases there were signs of acute dilatation of the heart. Sometimes there was more or less degeneration of the heart muscle. In this broader conception the enlargement of the thymus was to constitute but one manifestation of a general constitutional abnormality, and it is one of the brilliant achievements of Paltauf to have demonstrated that the enlarged thymus, in and of itself, could not produce death. In older patients showing signs of this condition Paltauf was able to show the blood picture of chlorosis, and so his name of lymphatic chlorotic constitution finds its justification. The claims of Paltauf found acceptance rather slowly at first, but the accumulated evidence of later years has abundantly justified his teaching, and today the status lymphaticus is generally recognized as a clinical entity.

The chief characteristics of this condition, as formulated by Paltauf and generally accepted by pathologists and clinicians today, are briefly summarized by Fried ander as follows: Generalized enlargement of the lymph node groups in various parts of the body, hypertrophy of the tonsils, of the follicles at the base of the tongue, and of the intestinal follicles, enlargement of the spleen and its follicles, the presence of a thymus of variable size—in some cases a persistent thymus at a time of life when normally the thymus has atrophied. In addition, there is found a narrowing and thinning of the walls of the aorta and the rest of the arterial system. With this there may be signs of acute cardiac dilatation; that is, a large, soft, pale heart muscle, showing, in some cases, the beginnings of degeneration. These individuals are usually of pale, pasty habitus; and in older cases the blood picture of chlorosis is constant. Sudden death is extremely common in these cases at all ages, either as the result of apparently insignificant trauma, or occurring without assignable cause. It is noteworthy that in children with status lymphaticus the prognosis of the acute infections is much more serious than in

[1] Archives of Pediatrics, July, 1907

normal children, in that sudden death at any stage of the affection is frequent. Furthermore, it is now known that patients with status lymphaticus take anesthetics very badly. Many of the cases of death under anesthesia are in reality attributable to this underlying constitutional abnormality. Death may occur either just at the beginning of the anesthesia or just after the exhibition of the anesthetic is concluded. It is thus a matter of importance to determine, if possible, before an anesthetic is given, whether status lymphaticus exists. Status lymphaticus, as such, produces no definite subjective symptoms. Where there is an enlarged thymus definite symptoms may manifest themselves. Congenital stridor, cough, or attacks of thymic asthma may supervene and may aid in the establishment of the diagnosis.

An admirable article on the subject is contributed by Howland,[1] of New York, who has had an unusually large experience with the condition. He refers to the extensive observations of Bovaird and Nicholl, obtained by weighing the glands of 495 children under the age of five years, which showed that the average weight of the thymus gland at autopsy is, during the first two years, about 6 grams, and that this gland does not apparently increase in size during the first two years, but at the end of that time diminishes somewhat. These findings are also almost in accord with similar findings of Friedleben. We may consider, therefore, that any gland weighing more than 10 grams is distinctly pathological. The autopsy appearance of this condition is well known. The thymus gland is very greatly enlarged and is at once the striking feature of the case. It extends from a short distance below the thyroid, so low, in marked cases, as to almost cover the heart. Usually consisting of two lateral lobes, there may be a well-developed third lobe. The weight varies from slightly above normal to 40 grams or more. No clear evidences of compression of trachea or bronchi have ever been seen by Howland, and they have been but seldom reported. All the lymphoid tissue of the body is hyperplastic, the tonsils and adenoids, the superficial as well as the deep lymph nodes. The spleen usually shows a great enlargement—from one and one-half to three times its normal size—and in its cross-section are seen the very greatly enlarged Malpighian bodies standing out like sago grains. Peyer's patches and the solitary follicles of the intestines also participate in the process. A microscopic examination shows nothing characteristic; the changes are merely an hyperplasia of structures normally present. The enlargement of the thymus gland is the characteristic finding; a great enlargement of this may be found without much involvement of the other lymphoid structures, but a great hyperplasia elsewhere and not in the thymus is practically never seen.

The symptoms exhibited by children suffering from this condition are many. Howland divides them into several classes. The first one is

[1] Archives of Pediatrics, August, 1907.

characterized by sudden death with or without some trifling shock, such as the beginning of anesthesia or the giving of antitoxin. There are practically no symptoms. The child turns over and dies, or is found dead in bed; sometimes there is a cry, a slight convulsion, or cyanosis. This is by no means rare; in fact, it is very common. Dudgeon, with a large experience in London, referring to children "found dead" who come into the coroner's hands with the diagnosis of "overlying" by their mothers, says that in his experience most of these are good examples of the lymphatic diathesis. These babies are fat and well nourished. At times the fatal result is delayed somewhat longer, and the cyanosis and rapid respiration may be noticed for five minutes or more. Careful inquiry has failed to show, however, that these children have showed tracheal obstruction.

The second class presents the most characteristic symptoms, and from these, at times, we are enabled to make an accurate diagnosis. These children are usually well nourished, but not always so, and are frequently rachitic. With or without some slight previous indisposition, the child becomes suddenly very ill. There may be vomiting or slight diarrhea, but the digestive symptoms are always in the background. The respiratory symptoms are prominent; there is usually very rapid, gasping respiration, with cyanosis, which may be marked; occasionally there is an incessant cough. The dyspnea is out of all proportion to the physical signs, which consist usually of a few scattered rales, increasing in number as the heart grows weaker. The child is generally unconscious. The pulse is of fair force at first, but becomes rapid and feeble toward the close. The temperature is, in the great majority of cases, very high, ranging from 104° F. to 107° F., or even higher. It is somewhat affected by efforts to reduce it, but soon rises again. The dyspnea is not of an obstructive type. These symptoms last from a few hours to forty-eight hours, the usual length being about twelve hours. The breathing becomes more rapid, the temperature rises constantly, sometimes to 109° F., the pulse becomes more feeble, and eventually the child dies, the convulsions often persisting to the end. Such a case would pass as a good example of acute bronchopneumonia, and as such they are often diagnosticated. The striking points are the dyspnea and cyanosis, without sufficient pulmonary involvement to explain them; the convulsions, and very high temperature.

More difficult of diagnosis are those cases that run a prolonged course, with a gradual onset. The symptoms, when fully developed, are, moreover, not distinctive. There are attacks of dyspnea lasting minutes or hours, alternating with periods of easy breathing. No explanation for the dyspnea can be found, and cyanosis of all grades of severity may accompany it. There may be at times entire cessation of breathing for a short period, with most intense cyanosis. The lungs are clear and intubation and tracheotomy, that have often been performed, have not

had the slightest effect in relieving the dyspnea. In periods of quiet breathing, however, the respiration and pulse may be irregular, and this may lead to the diagnosis of tuberculous meningitis. The temperature is usually low—100° F. to 102° F.—sometimes even subnormal. The children are more or less stupid and convulsions may occur at any time, but are more common at the close, death frequently taking place in the midst of one.

There remains but to mention those infrequent cases in which the thymus acts the part of a tumor obstructing respiration and causing constant dyspnea, as opposed to intermittent dyspnea, which is one of the distinguishing features of the other forms. There are several cases of recovery on record after the drawing up of this gland out of the mediastinum or the removal of the whole or part of the thymus. These patients have no symptoms beyond constant dyspnea, existing for a long time, perhaps from birth even, and the usual results of compression of the trachea.

In these different classes of cases two symptoms stand out prominently—dyspnea and convulsions. The dyspnea, however, is seldom of such type as to suggest obstruction; it is rather such a dyspnea as one sees in pneumonia; the stridor is lacking, and there is but a moderate retraction of the soft parts. The difficulty in breathing, however, comes and goes, disappearing and reappearing with great rapidity. It seems impossible to believe that any actual obstruction could appear and disappear so rapidly. In cases dying in the hospital, or out of it, careful inquiry has not elicited anything suggesting symptoms of suffocation, and in several instances these, had there been any present, could not have failed to have been noted, for some children died in their mother's or nurse's arms. In those cases presenting symptoms for a longer period of time the same was true, though the dyspnea was at times so extreme that operative measures were undertaken to relieve it, but without avail. In the victims of status lymphaticus the evidences of compression upon other structures, such as the veins, with the cyanosis which one would expect to be intense in the head and neck and upper extremities, are entirely lacking. The cyanosis frequently present is of a mild grade and uniform in its distribution.

Thinking that the symptoms present in the status lymphaticus might be due to some septic condition, the author and Dr. A. N. Richards tested the toxicity of an enlarged thymus. The gland, which weighed 15 grams, was completely crushed after freezing with liquid air until no cells were left intact. The powder was suspended in salt solution and 6 grams of this injected into each peritoneal cavity of two kittens, but no symptoms were noticed. They also endeavored to produce cytotoxins for this gland, as Flexner did for lymphatic glands and bone-marrow, but results were negative; as were also Moorhead's, in England. They then undertook experiments to test the autolytic power of the

organs and the toxicity of the blood, but thus far have obtained no positive results.

Infantile Atrophy. A study of 8 cases of infantile atrophy is reported by Wentworth,[1] who made a series of careful examinations of the gastric contents, with particular reference to the hydrochloric acid. He lays particular stress upon the fact that milk is a very highly specific food. Each species has its own characteristic milk, and on this milk the young of the species thrive best. Cows' milk is adapted to the calf and not to the human infant. Young infants fortunately possess considerable adaptability to abnormal conditions. The average infant can adjust itself to cows' milk if given a favorable chance. Experience shows that a large proportion of newborn infants that are fed soon after birth on mixtures of cows' milk require from ten days to two or three weeks to adjust themselves before they digest well and make satisfactory gains. A certain number cannot adjust themselves even when every precaution is taken, and a large number of those that might adjust themselves if handled properly in the beginning fail to do so because of mistakes in the strength or quantity of the milk. These are the infants that become atrophic. The above clinical facts and the fact that such infants, in the limited number of cases thus far examined, do not possess the normal amount of hydrochloric acid, or the normal amount of secretin, has led Wentworth to believe that human milk contains something that is essential to the baby, and that stimulates the functions of the digestive tract of the newborn without delay. When other kinds of nourishment are given, this normal stimulation is imperfect and more or less delayed. When once established, however, the baby, as a rule, progresses satisfactorily.

The hypothesis as to the cause of infantile atrophy as the result of this research may be briefly summarized as follows: The digestive functions of the very young infant are not activated because it does not receive the only food capable of properly activating them, namely, human milk. This leads the stomach to secrete an inadequate gastric juice. The absence of adequate gastric juice, in turn, does not stimulate the duodenum to form normal secretin. This defective secretin insufficiently stimulates the pancreatic secretion and leads probably to as yet unstudied disturbances in the function of the gut lower down.

The question as to what renders the milk of each species specific in this way is a question which is now engaging Wentworth's attention, and which he hopes to be able to answer in the near future. It is possible that it is due to hitherto overlooked specific substances or to certain hitherto disregarded factors in chemical composition.

Tardy Malnutrition. Most practitioners have encountered a troublesome type of disorders in children over two years of age. While free from diseases such as tuberculosis, syphilis, or chronic nephritis, they

[1] Journal of the American Medical Association, July 20, 1907.

show marked developmental defects in that they are under weight and undersized They may be of average height, but are always under weight; they tire easily; have diminished resistance to exercise as well as to disease; suffer invariably from anemia and have no appetite. Simple digestive disturbances in such children require several days before relief can be obtained. They are found in all classes of society. This condition is considered by Kerley.[1] He asserts that careful study of these cases demonstrates that the patient is not getting what a growing child has a right to expect. One fact in child management is often lost sight of by both layman and physician, namely, that a child has a definite business to perform—growth and development into physically the best type of adult. All other interests should be subservient to this. The acquirement of knowledge, for example, should never stand in the way of this result. The chief cause of malnutrition in older children, as in infants, is defective nutrition, due to ignorance of food values. The next important factor is excessive expenditure of energy and inadequate rest. Here various influences are operative. In order to attain the best physical development, the child, up to the eighth year, should sleep twelve hours out of the twenty-four. Late hours, entertainments, children's parties, boxed breakfast foods, are to be deprecated, and deserve part of the blame which has been attached to long school hours and overwork at school. Heredity is also a factor, but may be largely counteracted by rational methods of living. The best management in such cases consists in the proper selection of foods and the regulation of the environment and habits of life, in order that the food may be best utilized.

Habitual Vomiting in Infants. The causes of habitual vomiting form the subject of an excellent paper by Peiser.[2] He divides the cases into two general classes, the first of which thrive and often develop in a normal manner. Many are breast-fed, and the vomiting results from irregular feeding at too short intervals. On regulating the hours of nursing and the mother's habits of life, the vomiting ceases or becomes less troublesome. In another class the vomiting is due to too high percentage of fat in the milk. Still another class is made up of those neuropathic children whose sleep is disturbed, and who show numerous other symptoms of nerve instability. It is difficult to check the vomiting in these cases before the time of weaning. The second general class, according to Peiser, consists of those children who are poorly nourished and show but little gastric motility. Sometimes in these children the vomiting is a mere regurgitation and is brought on by the slightest disturbance after nursing. The author has examined numerous children of this type by the *x*-rays, and believes that, owing to the general muscular relaxation, the cardia is incompetent, and the food remains in the

[1] Medical Record, July 27, 1907.

[2] Berliner klinische Wochenschrift, July 22, 1907.

stomach longer than it normally should, owing to the reduced motility. It is, therefore, easily forced into the esophagus. In these children constitutional treatment is more important than the local, and consists in improving the general nutrition and in toning the muscular system.

The numerous causes of vomiting in young children are reviewed by Ashby.[1] In many conditions he approves of washing the stomach and beginning the feeding afresh with whey or very dilute milk.

THE RECURRENT (CYCLIC) VOMITING OF CHILDREN. Many different views regarding etiology have been held by writers, who have clearly described the symptomatology of recurrent vomiting, and all have agreed upon certain points. They have agreed that an underlying neurotic constitution, inherited or acquired, is practically the rule, and the exciting cause is often found in fright, excitement, great fatigue, anger, sudden exposure to cold, and rarely to blows upon the abdomen. All of these are believed to act upon or through the nervous system. The negative side is especially worthy of emphasis. They have agreed that the attacks are not directly attributable to errors in diet. A decided advance was made when Edsall, Pierson, and Marfan showed that in the attacks, acetone, diacetic acid, and β-oxybutyric acid are excreted in the urine in large amounts.

Acquainted with these facts, Howland and Richards[2] began to study the question of the etiology of these attacks. From a study of the urine of these cases they hoped to obtain an idea of the metabolic changes which accompany the attacks, in the belief that if this were possible they might be able, by suitable means, to reproduce the symptoms in experiments on animals. They confirmed the often repeated observation of the presence of acetone and diacetic acid. In some cases they found β-oxybutyric acid to be present. They also confirmed the observations of others in another respect, namely, that during, and especially at the outset of, the attack there is an increased excretion of uric acid. They found invariably a heavy sediment of amorphous urates, which failed to occur when the vomiting ceased. Their results on indican excretion agreed with those of other observers in showing that the quantity of indican is increased in a high degree before and in the first days of the attack. It may continue to be excreted in large amounts throughout the attack and may be detected in abnormal amounts even after recovery. They report numerous animal experiments and enter upon an extended discussion involving physiological chemistry, which cannot be readily condensed. The studies reported are most scientific in nature and constitute a valuable step toward the solution of this important and trying question.

In the light of our present knowledge, the authors conclude that shock, excitement, fright, anger, or something of the kind, is exerted upon an

[1] Pediatrics, December, 1906.

[2] Archives of Pediatrics, June, 1907.

unstable nervous system, unstable by inheritance or development, and also by age. We cannot doubt but that similar shocks are felt at a later time, but in the course of growth the brain and nervous system acquire a more stable equilibrium. As a result of this, in some way or other unknown to us, a diminished power of oxidation results and the organization loses the power to detoxify substances absorbed from the intestine which have been present there in excess. These circulate in the blood, exerting their poisonous action, and cannot be excreted by the kidneys because they are not brought to them in proper form. It seems probable that they are excreted and reabsorbed by the stomach and intestine. Vomiting would appear, therefore, to be eliminative and thus a protective mechanism. Finally, the power to oxidize and detoxify these substances returns; they are rapidly eliminated and quick improvement results.

The Gastro-intestinal Diseases of Children and Their Prevention. The results of the preventive treatment of these diseases have been very satisfactory, and a marked decrease in their occurrence has been for several years reported in almost every locality. Van Derslice[1] points out that they are diseases of the crowded centres of population. The greater number of cases of summer diarrhea come to us from the tenements of the large cities. They occur in the families where the cheaper, poorer foods are bought, and where hygiene is unknown. The prime etiological factor is the ingestion of improper food, improper as to quantity, quality, frequency of feeding, physical condition, or preparation. That these cases of summer diarrhea are largely preventable is shown by the few cases in breast-fed children and the comparative rarity in artificially fed children when sanitation and hygiene are good. That fresh air is the prophylaxis of greatest value should be emphasized, especially to the parents. The child should be kept in the open air as much as possible. When it is impracticable to send the child to the country, it should be taken to the parks or kept in the baby carriage out-of-doors most of the day.

In the treatment of the summer diarrheas there seem to be five indications: First, stop all food; second, remove the cause; third, give rest to the affected part; fourth, allay thirst by cold water frequently given in small amounts; fifth, keep the surface temperature as nearly normal as possible. All food is stopped for twenty-four hours. Plain water or gruel is allowed in small amounts, frequently repeated. The initial treatment is $\frac{1}{10}$ grain of calomel, given every hour for six doses, to be followed by a dram dose of castor oil. This should be sufficient to empty the stomach and small intestines. In the severer fermentative cases, immediately, or following the castor oil, a high colonic flushing is given. The first flushing is given under the personal supervision of the physician or by a trained nurse.

[1] Archives of Pediatrics, January, 1907.

Some very practical and pertinent suggestions for reducing the infant mortality during the summer months are made by Charles Herrman,[1] an inspector of the New York Board of Health. Although the mortality has been greatly diminished during the past ten years, it seemed to Herrman that the results were not, after all, in proportion to the energy expended. With the permission of the chief inspector, his work was limited last summer to one district containing 180 tenements and about 2000 families. A census of the children under two years was taken, and 310 were found. The character of the feeding was examined and a personal supervision was exercised during the whole summer. So excellent were the results and so much better were the conditions than they were in the surrounding districts that Herrman strongly urges this method of supervision.

The Department of Health of New York has now under consideration a plan according to which the city would be divided into small districts, with an inspector in charge of each district. The very poor cannot obtain proper instruction upon the management of infants. The mortality during the first few months among them is almost 10 per cent. Hence it is exceedingly important that they be seen early. When the birth certificate is received by the department the name and address could be sent to the inspector in whose district the birth occurred. He would visit the case if there was no private physician in attendance after ten days. If the people were poor and, in his judgment, required instruction, this would be given, and re-visits made as often as necessary. Cases in extreme need could be brought to the attention of the proper charities societies. The nurses of the department could assist by demonstrations to the mothers at home of the preparation of the milk.

Estimating that 40,000 infants are born annually in the tenements of Manhattan, with 100 inspectors each would have the supervision of 400. Of these, probably not more than 50 would require special attention during the summer months. Each inspector would take a personal pride in having for his district as low a mortality as possible. Charitable organizations could do much to improve the health of the very poor mothers during pregnancy and lactation, and make it possible for them to stay at home and take care of their infants during at least the first few months. From the birth of the child instruction should be given to such mothers in infant feeding and hygiene. Such instruction should be given by the inspectors of the health department on the notification of birth, supplemented, in the case of infants artificially fed, by demonstration by nurses of the methods of preparing food. During the summer months a selection should be made of those cases requiring special attention, namely, those artificially fed, those having ignorant or careless parents, and those in whose family deaths have occurred from summer diarrhea. All midwives should be licensed, and a license should be issued only

[1] Archives of Pediatrics, July, 1907

after they show a knowledge of the essentials of infant feeding. In dispensaries, instruction in the care and feeding of infants should be given to mothers, irrespective of the disease for which the infant is brought. In a recent address, Osler said that the physician is the teacher, not the servant of the public. By such work he would become a teacher in the best sense of the word.

Infant Foods. The past year has seen extraordinary activity in the campaign for securing better milk. The most notable feature of this activity is the fact that the daily press has become interested and has devoted extended space to its consideration and numerous municipal bodies have also been aroused to the work. It seems to be the feeling of many laymen that this is a new work and the evils have been but recently discovered. Every intelligent physician knows that it is an old work, and but little that is new has recently been brought forward. The pure milk industry had its fiftieth anniversary in 1906. Gail Borden took out his first patent for condensed milk in 1856, and insisted upon absolute cleanliness in the dairies contributing milk to his factories, and formulated rules which have been the basis of those which now govern the management of model dairies. In 1858 a crusade was inaugurated by Frank Leslie against the horrible condition of the stables in which was produced so-called swill milk, where brewery refuse was used as a food. The monotonous diet apparently did not conduce to the health of the cows. Their hair fell off in patches, the hoofs rotted, the tails dropped off, and a new phrase was added to the language, "stump-tail milk." The disgusting conditions are well described hy Piffard,[1] who quotes largely from old copies of *Leslie's Weekly.* No parallel to the conditions there described is to be found until a similar crusade in 1906 revealed the methods of the meat packers.

From that time slow progress was made until 1893, when the first medical milk commission was instituted by Coit, and a little earlier the Walker-Gordon laboratories were established, with their admirable dairies as the source of the milk supply. From that time until the present the campaign for better milk has been carried on by the medical profession, chiefly by pediatric practitioners. It is their work largely which has set in motion the movement which has now gained such headway. It is not strange that pediatric practitioners should be the first to see the dangers of impure milk and the advantages of pure milk. In 1895 I began to set forth these dangers in editorial articles in the *Archives of Pediatrics,* and seven years ago I began a special department in these pages,[2] under the caption, "Milk: Its Production and Use as an Infant Food," and since that date have yearly devoted attention to the same subject.

During the past year active measures have been taken by many mu-

[1] New York Medical Journal, April 27, 1907.

[2] PROGRESSIVE MEDICINE, March, 1901, p. 244

nicipalities, notably New York City. The Mayor appointed a commission, consisting of Drs. Bryant, Pruden, Holt, Jacobi, and Freeman, to investigate the milk situation and report in full what measures should be adopted to improve the milk supply. After extended deliberation they submitted an exhaustive report, a summary, as given by Williams,[1] being as follows: The danger of transmission of tuberculosis through milk has been greatly exaggerated and can be guarded against by the systematic inspection and condemnation of cows revealing tuberculosis on physical examination, which should be done by the State authorities; that protection against acute infectious diseases can be had through regulations of the Health Department and the education of the farmers, and by proper surveillance. The commission also made numerous recommendations, a part of them being as follows: That cans and bottles should be so labelled that it may be possible to trace to its source milk carrying infectious germs; that the sale of milk direct from cans shall be permitted only under proper sanitary conditions; that the sale of skimmed milk shall be permitted only in receptacles plainly marked in large letters; that infants' milk depots, for preparing properly pasteurized and modified milk for feeding babies, should be increased as a means of reducing the high infant mortality; that the Board of Health may require efficient sterilization or pasteurization of all milk which it finds unsafe for consumption as raw milk, but that all milk so treated shall be promptly cooled to at least 40° F., and be put into sterilized containers, under aseptic precautions, and marked with the time and date of pasteurization and the degree and duration of temperature.

Vigorous discussion upon the wholesale pasteurization of milk for large cities has been a notable feature of the year. Commercially pasteurized milk is subjected to a high temperature for a short time, and is usually contaminated before it reaches the consumer. According to the high authority of Freeman,[2] such milk almost invariably shows far more bacteria than the better grades of raw milk, for it is a well established fact that pasteurized milk when contaminated anew, even if kept moderately cool, allows a very rapid increase in bacterial content. The question then arises whether there is any advantage in destroying the original contamination if, after doing so, a second contamination is added. From the point of view of the milk dealer there is great advantage, for he destroys in pasteurizing the lactic acid bacteria which cause the milk to sour, leaving the peptonized species. This allows him to market milk which may be produced under filthy conditions and which could not otherwise be sold without causing him trouble with his customer. Commercial pasteurizing interferes with the crusade for clean milk by making dirty milk more marketable. The public buys it sup-

[1] Archives of Pediatrics, September, 1907.

[2] New York Medical Journal, March 23, 1907.

posing that it buys a fairly sterile milk, when in fact it gets a very highly contaminated milk, which deteriorates much faster than raw milk.

There are two distinct processes known as pasteurization, which Freeman thus describes: (1) Efficient pasteurization in nursing bottles intended to protect the consumer of the milk from bacteria and producing food with few bacteria; (2) commercial pasteurization, intended to make marketable dirty milk which could not otherwise be kept sweet until consumed, but which usually contains on reaching the consumer a large number of bacteria, including, possibly, pathogenic bacteria and the tubercle bacillus. Efficient pasteurization has been most valuable as used in homes and milk depots. Commercial pasteurization should be tolerated only as a temporary means of modifying the dangers of dirty milk.

Other important contributions upon this subject are those of Hamill;[1] Knox and Schorer,[2] a history of the pure milk movement in the United States, read by Coit before the International Milk Congress at Brussels, on September 12, 1907, and a series of papers by Goler, Darlington, Jordan, and Magruder.[3]

Infant Feeding. While the articles on this subject have been numerous, but little that is actually new has recently been presented. Foods and feeding have received extended consideration in these pages for two years past, where a comprehensive review of modern views may be found.[4] An excellent historical sketch of the development of percentage feeding is presented by Rotch,[5] and a brief but satisfactory review of the practical applications of the newer knowledge of the chemistry of milk is contributed by Southworth.[6] Southworth refers to the fact that little assistance in the solution of the feeding problems is to be derived from the older chemical studies of milk. The newer knowledge teaches that the casein in cows' milk is calcium casein, and is readily transformed by the rennet ferment in a weak acid medium into the calcium paracasein or junket clot. By the further addition of acid the clot is changed into acid paracasein curd. No such curding or clotting will take place if the milk is rendered alkaline. A moderate acidity enhances the activity of rennet, but in the absence of rennet sufficient acid to fully satisfy the casein's affinity for acid so changes the casein into acid casein curd that the subsequent addition of rennet produces no alteration in the type of curd. In short, the power of casein to combine either with alkalies or acids is so definite that it can be used to modify or prevent the formation of large tough con'ractile curds.

It is evident that agents capable of such radical influence upon the

[1] American Journal Medical Sciences, April, 1907.
[2] Archives of Pediatrics, July, 1907.
[3] Journal American Medical Association, September 28, 1907.
[4] PROGRESSIVE MEDICINE, March, 1906, and March, 1907.
[5] New York Medical Journal March 23, 1907.
[6] Archives of Pediatrics February, 1907.

processes of digestion should not be used without careful discrimination. We may employ them to change the character of the curds or to divide the labor between the stomach and intestine, but we must keep in mind that the infant's stomach must be developed during infancy, and that it gains strength only when a carefully graded increase of work is demanded of it. Decalcification of the casein by the citric acid radical of citrate of soda, the consequent prevention of tough rennet curds, and the easier digestibility of the subsequent combination of the casein with the hydrochloric acid of the gastric secretion explains the present popularity of the citrate of soda, which, it is claimed, enables larger proportions of the milk to be given without digestive disturbance. Thus, with some definite understanding of the action of both alkalies and acids upon milk, and their effects upon the digestive processes, the way is cleared for their more intelligent use both as routine measures and in the treatment of infants with enfeebled or disturbed digestions.

In an extensive study upon the *weight of breast-fed infants during the first two weeks of life*, Griffith and Gittings[1] found that over 75 per cent. of nursing mothers are able to nurse their infants by the third day, and they conclude that we are not justified in administering artificial food during the first days of life. The caloric value of infant food is the subject of articles by Moorehouse[2] and Thomas.[3] An editorial article in the same journal asserts that we have not yet the knowledge to render this subject one of much practical value. The caloric value of modified milk is also carefully studied by Ladd.[4]

The most novel work of recent date consists in the use of *living lactic acid bacilli to combat intestinal fermentation in infancy*. Buttermilk has long been occasionally used in infant feeding, and a number of articles have recently appeared upon the subject. It has usually been employed because it was felt that a suitable chemical combination could thus be readily obtained. A few observers of late, however, have advocated its use because of its lactic acid forming bacteria. Tissier's[5] observations show that in intestinal disease a bacterial transformation occurs. The normal bacteria disappear, and abnormal bacteria take their place. Among these abnormal bacteria one variety has especial pathogenic action against animals by attacking proteid substance and their derivatives. In doing this it forms a toxin, which has some necrotic power upon the tissues. This organism is the bacillus perfringens. Tissier concludes that the indications for treatment are to remove the fermenting intestinal contents by purgation and water diet, and to cause a reappearance of the normal intestinal flora. The latter object can be furthered

[1] Archives of Pediatrics, May, 1907.
[2] Ibid., February, 1907.
[3] Ibid.
[4] New York Medical Journal, September 28, 1907.
[5] Annales de l'Institut de Pasteur, xix, No. 5.

by diminishing the proteid and increasing the carbohydrate in the food, and can be more specifically obtained by introducing into the intestine an organism tending to inhibit the growth of abnormal forms and to overcome them and to cause their disappearance. In searching for a suitable organism for this latter purpose, he found that the bacillus bifidus and the lactic acid bacillus both stop the development of the perfringens, and he selected the latter, as it is more easily cultivated and handled. In cases of fermental diarrhea, Tissier gives his patients pure cultures of the lactic acid bacillus, and under this treatment he notes a rapid transformation of the stools, subsidence of the symptoms, and gain in weight.

In view of these findings, Dunn[1] undertook the treatment of 35 cases of intestinal disorder, and selected buttermilk as a convenient vehicle for giving lactic acid bacilli. Of these there was evidence of a favorable result, as shown by a change in the character of the dejecta and by gain in weight in 23. In 3 there was immediate cessation of the diarrhea and favorable change in the character of the dejecta, without gain in weight. In 9 cases the lactic acid bacilli produced no effect. These failures were all among the irritative type of disease. Of the cases of fermental type, 23 were successful and but 2 failed. This seemed to show that the buttermilk feeding had some specific action, and its results were not simply due to chemical composition. To determine this, in 14 resistant cases of the fermental type the buttermilk was first given in a pasteurized form, and after a sufficient trial had demonstrated a failure to improve, the pasteurization was omitted, no other change being made. In everyone of the cases the omitting of the pasteurization was followed by immediate improvement. These investigations would seem to explain the reason for success and failure in many cases now being reported in many journals, notably those of Carpenter, Fife, and Judson.[2]

Some interesting observations are reported by Kerley[3] upon the *relations of cane sugar to the diseases of childhood.* He believes that some children are so susceptible to cane sugar as to render its use very deleterious. "A sugar susceptible" is usually a child of rheumatic or gouty ancestry. Kerley believes that bronchitis, asthma, coryza, and eczema are often the result of its excessive use. In many such cases the tendency to these conditions, after resisting all treatment, disappears when sugar is excluded from the diet. Sugar does not seem to be toxic in all individuals, and in some only when used in excessive amounts.

It would seem that to some individuals cane sugar is sufficiently toxic to produce a perversion of function with symptoms of its own, as in cyclic vomiting, and in others to produce enough change to invite or allow bacterial invasion, as in acute articular rheumatism and endocarditis.

[1] Archives of Pediatrics, April, 1907.
[2] Ibid., September, 1907.
[3] Ibid., October, 1907.

The *proteids of cows' milk* have been the subject of continued study and comment. One of the most practical contributions to the subject is made by Southworth,[1] who lays stress upon the fact that it is the toughness, contractility, and massiveness of the paracasein curd that makes cows' milk so hard for the young infant to digest. Most methods of preparing milk for infants have had as their real end and justification the subdivision of such curds or their partial or total prevention. Just in proportion to our success in limiting the formation of these paracasein curds, the ability of the infant to digest cows' milk increases. In short, the difficulty is not with the digestion of the casein, as usually stated, but with the digestion of the paracasein compounds. The disadvantages of too low proteids in infant feeding are well set forth by Hand,[2] and the various resources presented by percentage feeding are described by Dunn[3] in a particularly practical paper.

[1] Archives of Pediatrics, October, 1907.
[2] Journal of American Medical Association, November 16, 1907.
[3] Archives of Pediatrics, October, 1907.

RHINOLOGY AND LARYNGOLOGY.

By D. BRADEN KYLE.

RHINOLOGY.

Submucous Perineural Injections of Anesthetic Solutions in the Nose. Gustav Killian[1] has found the perineural injection an especially available technique because of the simplicity of the nerve distribution of the nasal fossæ. He anesthetizes the septal areas by means of two injections, the one anteroposteriorly in the region of the nervus ethmoidalis, the other posterosuperiorly in the area of the nervus nasopalatinus. The higher the first injection is applied the larger will be the field of anesthesia obtained. The needle should be introduced just anterior to the tuberculum septi in an upward direction below the mucous membrane. Even a few drops of the injecting fluid are so widely disseminated that there need be no fear of missing the nerve in this anesthesia. At no time are more than a few drops necessary for this injection. The second injection is conducted in a similar manner. The course of the nervous nasopalatinus can be readily traced by locating the upper margin of the vomer. Locate an imaginary arch from the floor of the nose to the level of the upper border of the choana; this arch should rise posteriorly to the fissura olfactoria. If this point cannot be reached, the injection may be made more anteriorly, and at a point just below the middle of the lower border of the middle turbinate. The needle may penetrate somewhat farther backward and upward under the mucosa. Here, too, a few drops suffice to anesthetize the nerve. For the injection in the deeper area he uses a long hypodermic needle, arranged at an angle to the syringe. The solution used for the injection is made by dissolving two tablets of suprarenin cocaine (Braun—form A) in 5 c.c. of sterile salt solution. In five to ten minutes the entire area limited by the points of injection is anesthetized. He also makes a third injection anteriorly below the vomer.

Anesthesia of the inferior turbinate is accomplished in a similar manner. The anterior injection is made at the point of the lateral branch of the nervus ethmoidalis, and the posterior over the branch of the lower turbinate, the ramus nasalis posterolateralis, being a branch from the ganglion sphenopalatinum. The point of the first injection is located somewhat anterior to and above the anterior end of the inferior turbi-

[1] Laryngoscope, July, 1907.

nate; the point of the second injection is over the posterior end of the lower turbinate. The point of the first injection is easily reached; the second is somewhat difficult and occasionally impossible of access. Killian thinks, however, that in the case of the inferior turbinate the anesthesia produced by applying the solution to the surface is more practical, from the fact that the posterior area is so difficult to reach and because toxic symptoms are readily produced, even when only a few drops are injected into the turbinate. He has also successfully anesthetized the mucous membrane of the maxillary antrum by submucous injection in the area of the middle meatus of the nose.

Resection of the Cartilaginous Septum. I[1] have called attention to several important points in connection with the resection of the triangular deflection of the cartilaginous septum. Resection of a portion of the triangular cartilage is by no means a new procedure, but recently there has been a tendency to advocate a too radical method. The saving of the mucous membrane and a portion of the cartilage, as well as the prevention of scar tissue, are the essential features of this operation. In the triangular much difficulty has been experienced in freeing the mucous membrane at the point of angle, and at that point there is greater danger of perforation and ulceration.

In such cases I have obtained excellent results by the following method: By forcing the finger into the occluded nostril the triangular cartilage can be shoved over sufficiently to force it out on the open side. I then make an incision through the mucous membrane just beyond the junction of the skin and mucous membrane, cutting down directly over the anterior edge of the triangular cartilage. By stretching open this incision and making pressure with the finger in the occluded nostril, the cartilage can be pushed forward through the incision. It is extremely important, in order that the mucous membrane may be successfully dissected from the cartilage, that the incision be carried through the perichondrium to the cartilage; once this is done, the mucous membrane can be stripped from the cartilage very readily.

I prefer the dural separator to any of the knives devised for the purpose, my reason being that it is more flexible, blunt-pointed, and less likely to produce a perforation. When the mucous membrane has been dissected back on the occluded side to the apex of the triangle, instead of trying to dissect out the angle, I force the cartilaginous septum over into the median line by means of the nasal dilator. By doing this two or three times the septum is sufficiently pushed over or rendered perfectly pliable, so that it can be held almost in the median line by pressure from the finger. The cutting and dissection is all done through the wide-open nostril on the opposite side from the obstruction, there being no incision on the obstructed side. The mucous membrane, up to this point, is already separated from the cartilage back to the angular part of the

[1] Laryngoscope, May, 1907.

deflection; at this point some difficulty is usually experienced, owing to the fact that the mucous membrane, having been subjected to irritation and continued chronic inflammatory changes, is adherent. This tendency to adhesion is more marked at the floor of the nose. After the septum has been shoved over and the angle reduced to a straight line, the resection over this point is begun at the top of the septum. There less adhesion will be found, and you can get past the line of the angle and dissect from above downward, keeping the little finger in the originally obstructed nostril, so as to keep the septum as nearly in the median line as possible, and the finger is also kept directly over the wide blade of the separator. In this way perforation is avoided and all triangular dissection instruments are done away with.

After the mucous membrane has been dissected back of the apex of the angular deflection the swivel-knife is employed for the removal of the cartilage. I prefer to start at the floor of the nose, cutting the cartilage free back past the point of greatest deflection; then, instead of carrying it up to the highest point of the cartilage, cut diagonally toward the tip of the nose; this removes a triangular piece of cartilage and leaves the upper portion for nasal support. No tendency of the remaining portion of the cartilage to deflect either way has been observed. It is not necessary to insert an intranasal tube or splint for support. In this method there is no injury done to the mucous membrane, which lessens the tendency to perforation; the support to the nose is still retained, while the primary object of the operation, that of establishing nasal breathing, is accomplished.

Rockwell A. Coffin[1] considers the most objectionable features of the "window operation" to be the length of time required to perform it, and the "strain" to patient and operator. He claims to overcome both these objections in the operation described. He performs his operation in two short sittings. At the first sitting a "more or less perpendicular" incision is made anterior to the deviation. The space thus made is injected with sterilized vaseline, and the nose left for one week. At the end of that time an incision is made on the opposite side and anterior to the first cut, and the mucoperichondrium raised. The deviation is then removed and a pledget of antiseptic cotton introduced for twenty-four hours.

Correction of Saddle Nose. L. Freeman,[2] of Denver, offers a new operative method for the correction of saddle nose. He makes a short incision across the root of the nose, between the eyes. Through this incision the skin is undermined along the bridge to the tip, and also well down on either side, if the skin requires much stretching. After the pocket beneath the skin has been prepared the concavity of the nose will necessitate the insertion of the plate at such an angle that its ends will catch in the tissues, thus preventing it from sliding into position. In

[1] Boston Medical and Surgical Journal, January 17, 1907.
[2] Annals of Surgery, August, 1907.

order to overcome this difficulty, Freeman perforates the tip of the nose with the point of a large darning-needle, which is then reversed and the blunt end pushed upward subcutaneously until it passes out through the incision. By using this needle as a guide, the plate is easily slid into place. The wound is closed by means of a subcuticular suture, or a little cotton and collodion. There is no tendency to gaping, and only an insignificant scar results.

Septal Perforations. Chevalier Jackson[1] describes a plastic operation for the closure of a small septal perforation, which consists of a large round flap taken from the mucosa and submucosa over the inferior turbinate. The flap is raised and, after freshening the edges of the perforation, is stitched in place. If the perforation is of larger size, it is well to duplicate it on the opposite side. The synechia formed by the union of the flap with the septum is readily removed by clipping out a section of the bridge formed by the flap and inserting a strip of bismuth lint for five days. This operation can be employed on cicatricial septa and where the cartilage has been removed by the submucous resection.

The Turbinates. TURBINECTOMY. Sidney Yankauer,[2] of New York, describes a new method of operating upon turbinal hypertrophies. The operation consists of two stages: First, the excision of the hypertrophied tissue; second, the suture of the wound. It is performed in the following manner: After the use of cocaine and adrenalin, an incision is made with a knife above and another below the hypertrophy, the two incisions meeting at a sharp angle in front and behind. The included mass is then dissected out with elevators and scissors. Enough of the bone is then removed with punch forceps to bring the edges of the wound together. In some of the cases the entire mass, including the bone, was removed at one stroke with strong scissors, but owing to the retraction of the mucous membrane it was necessary to remove an additional strip of the bone. As the bone is very rough, especially near its inferior border, it is difficult to separate the soft parts in a satisfactory manner. When the wound has been properly prepared, the edges are brought together with sutures. For this purpose No. 0 catgut is used, sterilized by boiling it in a supersaturated solution of ammonium sulphate. From two to ten sutures were used, the average number being five. The sutures were placed about one-fourth inch apart, beginning posteriorly and working forward. The nose was then packed with punk impregnated with aristol powder.

The intranasal suture is the essential feature of this operation, and the instruments necessary to pass and tie the suture are three in number —a needle to thrust the thread through the mucous membrane, a hook to grasp and withdraw the thread, and the suture closer. To these may be added a fourth, the crotch forceps, to steady the mucous membrane during the passage of the needle. Through both edges of the wound in

[1] Medical Record, October 12, 1907

[2] Laryngoscope, February, 1907

the mucous membrane a catgut stitch is passed by means of the needle. The suture end is caught with a small hook pulled out of the nose, and the needle is then withdrawn. A single knot is made in the catgut, one end of which is then passed through the eye of the suture closer, and with this instrument the knot is pushed up into the nose. A second knot is similarly carried up to the wound, and the suture ends cut off. The remaining stitches are introduced in like manner.

Yankauer reports that by securing primary union with sutures, healing is complete in one week; whereas, when the wound is left to close by granulations, healing requires four weeks or more.

REDUCTION OF HYPERTROPHIES OF THE INFERIOR TURBINATE. Kuyk[1] offers a new method for the reduction of hypertrophy or hyperplasia of the inferior turbinate without impairing its function. The operation consists of one or more incisions through the mucous membrane of the enlarged turbinate well down to the bone. The bony turbinate is then sawed into by means of a broad nasal saw. The depth to which the saw is made to cut depends upon the size and character of the bone. If the bone be hypertrophied and dense, the cut is carried well down into its substance. The nostril is next cleansed, the edges of the incised mucous membrane are carefully packed into the osseous cut, which, as above indicated, has been purposely made with a broad saw to admit of the introduction of the overlapping edges of the soft parts. This adjustment of the tissues is maintained by a carefully placed pledget of cotton saturated in a solution of equal parts of compound tincture of benzoin and flexible collodion. This dressing may remain in situ for two or three days, when, after careful soaking, it is as carefully removed. The edges of the incision should not be disturbed when the cotton is removed, else the object of the operation will be defeated. Rarely will repacking be necessary. The direction of the incision will depend on the nature of the enlargement; it may be made from above downward, at the most dependent part of the turbinate, upward, or, as is most usually necessary, directly into the body from within outward. It is found that, following this operation, much absorption occurs, so that in the course of a short time the nostril is sufficient for the full performance of its physiological function. The advantages claimed for this procedure over cauterization with either chemicals or the electrocautery, as well as the partial or complete turbinectomy, are: (1) Preservation of physiologically active tissue; (2) freedom from disagreeable reaction or complications; (3) absence of shock, since but slight local anesthesia is necessary; (4) freedom from aggravation of existent disease in related cavities; and (5) ease and speed in performance, the instruments used being few and simple.

SUBMUCOUS ELECTROLYSIS OF THE INFERIOR TURBINATE. Albert H. Andrews[2] advocates submucous electrolysis in abnormalities of the

[1] Journal of the American Medical Association, March 2, 1907.

[2] Journal of Ophthalmology and Otolaryngology, September, 1907

inferior turbinate when it seems desirable to bring about a great amount of shrinkage in the soft tissues with the least possible reaction. He employs two sharp needles, four or five inches long, and an ordinary cautery handle. The two needles should be the same length and insulated with shellac in their middle portion, where they are liable to come in contact with the anterior naris. The turbinate body is thoroughly cocainized, but no suprarenal preparation should be used. The depth to which it is proposed to insert the needles should be estimated (usually three-fourths to one inch) and shellac applied to the needles in such a way that when the needles are inserted the shellac will just enter the soft tissue. This is important, because if the point of entrance is not protected, an open tunnel will be burned into the tissue, which is sure to become infected. If the shellac is covered with some pigment, it will be easier to determine when it has entered the tissue. The first needle is inserted to the desired depth, and the second one introduced parallel to it and about 4 to 6 mm. from it. The cautery handle is then attached and the current turned on. Eight to ten milliampères for eight to ten minutes is usually sufficient. The amount of current used should be regulated by the depth of the needles. The deeper the needles are inserted the stronger the current required to produce a given effect upon the tissues between them.

Observation of the turbinate during the application of the current will show it rapidly blanching in the neighborhood of the needles. If the needles lie close to the surface the current suggested may be too strong, while if they lie deep in an unusually large turbinate even more current can be used. In removing the needles the one to which the negative pole was attached will come out easily and the opening close immediately without bleeding. The positive needle, however, will be firmly adherent to the tissues, and, if removed forcibly, considerable bleeding will occur. This may be entirely prevented by attaching the negative wire to this needle and the positive wire to a sponge electrode held in the hand; then turn on about two milliampères until the needle comes out without using any traction. The tissues which have been destroyed by the electric current are rapidly absorbed, a certain amount of connective tissue forming, which contracts and binds down the mucous membrane to the bone. Another and probably more important element in the reduction of these enlarged turbinates is the destruction of the bloodvessels passing through this area. Shrinkage then occurs because of interference with the blood supply. The advantages claimed for this plan of treatment are: (1) The slight reaction in proportion to the results obtained. (2) The freedom from danger of secondary infection from dust or from discharge within the nose itself. (3) Absence of pain or discomfort either during or after the operation.

Atrophic Rhinitis. C. A. Parker[1] suggests that the unilateral form of atrophic rhinitis differs from the bilateral form both etiologically and

[1] Clinical Journal, London, October 16, 1907.

clinically, and that it may be relieved by surgical measures. He gives the following as the etiological factors in the unilateral form of the disease: (1) Deviation of the septum, causing nasal obstruction on the one side and excessive roominess on the other, which abnormalities do not reach their greatest proportions until after puberty. (2) The establishment of chronic mucopurulent discharge as a result of acute rhinitis or influenza. (3) Drying of the mucopus into crusts, due in a great measure to the fact that, the opposite side being occluded by the deviation, the whole duty of warming and moistening the inspired air is thrown on the patent side, and hence an undue amount of moisture is abstracted and the discharges become dry and adherent to the mucous membrane. (4) Roominess of the affected side, preventing the expulsion of these dried discharges by blowing the nose. (5) Putrefaction of the retained crusts, leading to ozena or stench.

All methods of treatment are based on the necessity of keeping the nasal cavities absolutely clean, and preventing the retention, drying, and putrefaction of the discharge. The simplest method of attaining these ends is by first systematically cleansing the nose and then packing with cyanide gauze. The crust should be loosened by the application of peroxide of hydrogen and then the nasal cavities syringed until every particle of crust and all discharge have been removed. The nasal cavities are then packed with gauze, about 18 inches being introduced on each side. The gauze should be removed night and morning and the nose syringed and repacked. In unilateral atrophic rhinitis the roomy side should be sufficiently reduced in size, the stenosed nostril enlarged and rendered physiologically active, and the mucopurulent discharge relieved. The first and second of these indications are met by Killian's submucous resection of the septum, and the third by the subsequent use of appropriate local treatment.

Joseph C. Beck[1] believes that the involvement of the sinuses, whether primary or secondary, has considerable to do with atrophic rhinitis. He is of the opinion that the condition may be primary in the nose or the sinuses, but that in the majority of cases, when treatment is directed toward these accessory cavities, in addition to the nasal and general treatment, the results are better.

A number of cases are reported in which radiographs were taken, showing the involvement of the various accessory sinuses of the nose, which was afterward proved by operation. He gives in detail the results of several methods of treatment employed in his cases, from which he draws the following conclusions: (1) That the sinuses are very frequently involved in atrophic rhinitis; whether primarily or secondarily is not always possible to determine. (2) That when the sinuses are involved the atrophy must have some other cause, as, for instance, bacteria, heredity, etc., for we find so many sinus troubles with hypertrophy.

[1] Annals of Otology, Rhinology, and Laryngology, June, 1907.

(3) That radiographs are an aid in diagnosis and should be practised by every rhinologist. (4) That treatment directed to the sinuses is followed by improvement much more readily than when they are not treated. (5) That surgical intervention, preferably intranasal, gives the best results. (6) That the results of local treatment, as by tamponing, massage, electricity, vapor therapy, paraffin injection, Bier's treatment, etc., are brought about by the production of hyperemia and leukocytosis, bringing about an alternating condition, and possibly a resolution or restitution of glandular structure, normal mucous membrane, and even of the erectile tissue.

The employment of massage of the inferior turbinates in atrophic rhinitis is reported on favorably by Weightman.[1] The patients were instructed to keep their nostrils clear of crusts by the free use of diluted Dobell's solution at least three times a day, and to remain in the house for half an hour after using it. The inferior turbinates were massaged twice a week by gentle stroking with an applicator carrying a pledget of cotton saturated with the solution. Considerable improvement resulted in one month. The mucous membrane became more nearly normal in appearance, the dryness disappeared, and there was considerable return of the sense of smell. In treating these cases, the administration of small doses of potassium iodide seemed to aid materially by increasing the nasal and pharyngeal mucus.

Light Treatment of Ozena. Ignazio Dionisio,[2] who has previously published accounts of his treatment of ozena by a modification of Finsen's method, recently reviewed his results and produced some of his old patients before the Royal Academy of Turin. Two of the patients, a boy and a girl, each aged seventeen years, were shown to the Academy as cured in 1904. The nasal secretion is now almost normal in quantity and quality. The respiratory function is very good; the atrophy of the mucosa has disappeared. In one patient the sense of smell has returned. The cures, therefore, have been permanent.

The cases were originally typical cases of ozena, with atrophy of the mucosa, crusty secretion, and fetor in spite of frequently repeated douching. In each case the treatment was carried on for many months, and included more than two hundred sittings of two hours each. The other two patients, a girl of nine years and a man aged twenty-two years, were shown to the Academy in December, 1905, to exhibit the gravity of the disease before treatment began. They now have no disturbance of any sort. The man has given up douching altogether, and the girl washes her nose out once or twice a week with salt and water. Treatment in each case lasted three months, and involved one hundred and twenty sittings of one hour each. The shorter period of treatment

[1] The Postgraduate, New York, August, 1907.

[2] Gazz. Med. Ital., February 21, 1907.

necessary is not due to the less intense nature of the disease, but to the improved technique.

Since this treatment was begun, in 1901, it has been applied to 54 severe cases. Not all of these underwent a complete course. Three of the patients obtained no benefit; the others were very greatly improved or completely cured. In some cases counted as cured, and enabled for a long time to do without the douche, it occasionally happened that a severe coryza caused very free discharge, with some fetor, which disappeared rapidly with douching and the disappearance of the coryza. In a few cases there was a true relapse, quickly cured by a few radiotherapeutic sittings. The improvement in methods has been so great that one hundred hours suffice to produce the effects which a few years ago needed six hundred hours.

Hay Fever. I[1] have reported the results of some further investigations of the chemistry of the saliva in relation to hay fever. In at least 60 per cent. of the cases I have been able to demonstrate that the local irritation is primarily due to an altered chemistry and an altered resistance, and these 60 per cent. of cases may be divided as follows: (1) The class in which the secretions, when coming to the surface, are non-irritating, but undergo chemical change and produce irritation. This may be either acid, alkaline, or neutral. (2) Cases in which the secretion, when it comes to the surface, is irritating without any chemical change. (3) When the secretion comes to the surface it comes in contact with certain extraneous material, and certain secretions coming in contact with certain materials produce by chemical change an irritant; hence the term ragweed fever, rose cold, etc. Any individual having nasal obstruction in the form of deflected septum, narrow nostrils, polypoid growths, etc., or the neurotic type with lowered vitality, may suffer a more aggravated form than those not having such nasal obstruction or underlying systemic condition. I do not claim that this is the cause of all cases of hay fever, but I am positive that at least 60 per cent. can be worked out on this basis. Excessive alkalinity will produce really more irritation than excessive acidity, as it is well known that strong alkalies are just as caustic and escharotic as strong acids.

In regard to the treatment, there are many cases of hay fever in which any local treatment, instead of relieving the symptoms, seems to either aggravate them or to bring on an attack. Occasionally, however, the alkaline or acid douches seem to afford some relief. This is easily explained by the fact that the alkali or acid would change the reaction of the irritating secretion; yet if either solution was used in the wrong type of case, this influence would only be aggravated. Some cases certainly receive considerable benefit from local sedatives, and if certain sensitive areas are removed the susceptibility on the part of the individual would

[1] Journal of the American Medical Association, August 3, 1907.

be lessened, although the underlying cause still remains. The plan of treatment which I have followed, and which is based on the chemical analysis, necessarily varies in different individuals. The general plan is to stimulate all the secretions and thus increase elimination.

The treatment will depend on whether the condition is alkaline, acid, or neutral, whether it is due to the presence of ammonium salts, the sodium salt, potassium salts, or whether there are present sulphocyanides, lactic acid, or oxalic acid. To meet these conditions citrate of soda, lactate of soda, benzoate of soda, which renders inert active compounds, boric acid, dilute hydrochloric acid, dilute nitric acid, various forms of salicylates, sodium chloride—all may be used to counteract a certain chemical ingredient present in the saliva, so that the drug must be selected purely on this basis. I have seen several cases relieved by the administration of sodium chloride, others by the administration of benzoate of soda, others by boric acid, and so on through the list, after first increasing elimination as much as possible through the skin and intestinal tract. The patient is always instructed to drink plenty of water. Following this basis, without any application whatever to the nasal mucous membrane, I have relieved 60 per cent. of the cases. The other 40 per cent. it was impossible to relieve by either local or systemic remedies, and I was also unable to analyze and separate the irritant from the secretion. Whether these 40 per cent. belong to some other type of cases I do not attempt to say. The cases relieved passed through the attacks year by year by taking the medicine before the onset and occasionally during the period in which they have suffered from the hay fever. Some cases extended back over a period of eight or ten years, and others varying down to the last year.

H. Holbrook Curtis,[1] after reviewing the etiology and recent treatment of hay fever, reaches the following conclusions: (1) Hay fever is a disorder amenable to no specific treatment. (2) The number of cases of hyperesthetic rhinitis from other causes than ragweed and other pollens is about one-third of the total number. (3) About one-third of the cases supposed to be due to pollen reaction may be relieved by constitutional and surgical methods of treatment. Predisposition to attack in these cases being due to definite causes would suggest the theory that induced enervation of the sympathetic was an important etiological factor. (4) Primary intoxications may take place from pollen toxins in cases where the sympathetic system apparently is not previously enervated. These cases, theoretically, should react to antitoxin treatment. (5) The consensus of opinion today is against the claims made for pollantin, though observers who have been instructed personally by Professor Dunbar indorse unqualifiedly the great benefit to be derived from the treatment. (6) Medically, the suprarenal capsule products hold the first place today in the treatment of hyperesthetic rhinitis. (7) The importance of con-

[1] Journal of the American Medical Association, July 13, 1907

stitutional treatment as an adjunct to any local application is of supreme importance. (8) The best of all treatments yet found is the climatic, with previous attention to nasal conditions.

Schadle[1] advances the theory that *catarrhal sinusitis of the antrum of Highmore* is an important etiological factor in the causation of hay fever. He states that the affection does not occur in persons in whom the ostium maxillare is of the normal size, but in those in whom disease, malformation, or injury has made the antral opening of sufficient size to admit germs to the interior of the cavity. Under normal conditions, the opening is for the purpose of ventilation only, and the cavity is sterile, the opening being securely protected by the tissues and hard to reach. The nervous supply is very abundant and communicates with that of all parts of the nasal cavities. The peculiar exciting causes of hay fever—dust, pollen, etc.—enter the antral cavity and there produce irritation. Schadle has treated 91 cases of hay fever and rose cold of varying degrees by washing out and medicating the antrum, and has obtained the best results in nearly all cases treated. Only one case was unbenefited. Most of them were entirely cured in from one to two weeks, and remained so.

Thyroid Extract in Hay Fever. Pottier[2] presented a brief report to the Société médicale de l'Elysée of 3 cases of hay fever in which he had employed thyroid extract. In the first case, medication was begun rather late and after the patient had gone to the seashore, so that the favorable result may have been only a coincidence. It was that of a girl of eighteen years, who was cured after she had taken twenty-four cachets of thyroid extract (each containing grain $1\frac{2}{3}$, or 10 centigrams). The second case was that of a man, aged seventy years, who had suffered from hay fever for thirty years. Of late years he had developed, in addition, chronic bronchitis, emphysema, and arteriosclerosis. In this case the results obtained from thyroid extract were suppression of the attacks of sneezing and of the nasal reflex, also the disturbances of the nasal mucosa; but the difficulty in breathing caused by the bronchitis and emphysema was not suppressed. In this case the treatment was interrupted by eye trouble, hemorrhages into the vitreous, and cataract (due to the arteriosclerosis). The third case, a man aged thirty-four years, had been subject to attacks of hay fever for seventeen years; they usually began about the first of May and lasted until the end of summer. Local treatment to the nose was without result. The treatment began when the disease was at its height. On the first three days he took one capsule containing 0.1 gram of extract. On the next two days treatment was suspended, but on the next four days he took two capsules daily. Improvement in the symptoms was observed on the second day. For the succeeding fifteen or twenty days he took sometimes one dose, sometimes two doses, daily. Seventy-two capsules were taken in all during the course of the summer.

[1] Medical Record, May 25, 1907.

[2] Journal de médecine de Paris, April 7, 1907.

The patient reported that "for the first time, although the summer of 1906 was particularly hot and long, he had not suffered at all even from the dust, in the sunshine, in an automobile, or in a carriage, and he attributed this unexpected cure to the treatment." His attacks previously for sixteen years had come on regularly every summer, and continued in spite of all previous treatment.

P. Heymann[1] has also obtained good results in hay fever from the administration of preparations of the thyroid gland, and he is inclined to ascribe the disease to a nervous diathesis, probably in the region of the sympathetic system.

Cauterization of the Four Susceptible Areas of the Nasal Mucosa. Killian[2] finds four distinct areas in the nasal mucosa which are particularly susceptible to external irritants. These are: (1) The anterior portion of the septum; (2) the anterior end of the inferior turbinate; (3) the lateral wall of the nose slightly above the region of the anterior end of the middle turbinate; and (4) the upper part of the septum about the tubercle. By probing, one can easily prove that these spots exhibit the greatest sensitiveness, and that the different areas vary greatly in their sensitiveness in the same individual.

The relation of bronchial asthma to the nasal cavities, especially in vasomotor forms of rhinitis, is established beyond doubt by numerous observations. The local treatment consists in the removal of the causes which excite hyperesthesia of the mucous membrane and elimination of reflexes, as well as of predisposing causes within the nose. This is accomplished by cauterization of the four areas with trichloracetic acid after preliminary cocainization. As this reagent diffuses itself very rapidly, it should be applied with a small cotton-tipped applicator, and care used to keep it circumscribed. On each of these four areas a cauterized surface of less than one-half inch in diameter suffices. With such limitation the results, even when all four points are cauterized at once, are comparatively slight. The patient is directed to remain quiet from one to two days, and in a few days the surfaces are healed. In the majority of cases the results are at once noticeable, while in other cases improvement is delayed until the eschar after cauterization has disappeared. In the hands of skilful and careful rhinologists this procedure, in conjunction with other indicated intranasal medication, will prove of much value to the patient.

Asthma. Emmett L. Smith,[3] after an observation of 300 asthmatic patients, says that while it is evident that even in true asthma there is a vasomotor disturbance, it is not the vasomotor distention in the bronchial mucosa which produces it, but that the asthma is due to the pressure on the asthmatogenous points in the nasal fossæ. This acts on the

[1] Berliner klinische Wochenschrift, April 1, 1907.
[2] Laryngoscope, May, 1907.
[3] Medical Record, June 29, 1907.

pneumogastric nerve, and explains the various phenomena of true asthma. This pressure irritation may be on the nasal septum, or, rarely, there may be no occlusion of the nares, and it may be due to a closed empyema of the ethmoid cells or sinusitis. This is the pathology of true asthma, and is confirmed by physiological experiments. It also can be confirmed in every case of true asthma by relieving the pressure on these areas, which gives almost instant relief to the spasm. The relief is made permanent by such treatment as will prevent this pressure.

If a person is chilled, or has cold feet, or if the air is cold, or cold water is applied to the entire bodily surface, the result is vasoconstriction of the skin, and as the blood leaves the skin it causes internal congestion and increases the nasal pressure, which aggravates the asthma. However, if the skin circulation is normal, the effect of inhaling cold, dry air is to contract the nasal mucous membrane and to relieve the dyspnea in proportion as the nasal engorgement is relieved. Moist heat to the skin surface produces vasodilatation, and as the skin reddens the nasal engorgement is relieved.

The inhalation of chloroform for asthma may act (1) by local anesthesia on nasal turgescence, (2) by lowering arterial pressure, or (3) by the inhibition of the heart. The action of iodine in asthma, when favorable, he believes, is due to its well-known action in reducing glandular (bronchial) swelling and pressure, and to its specific action on the nasal tissues. In cases of arteriosclerosis there are attacks of dyspnea simulating asthma, and the action of iodine in these cases has often been credited as helping asthma. The nitrites are general vasodilators, and amyl nitrite, nitroglycerin, sodium nitrite, and erythrol tetranitrate act as such for from one minute to six hours. Any relief from the use of these in true asthma comes from their action in equalizing the entire vascular system and relieving the pressure on the asthmatogenic areas. The use of adrenalin in asthma acts only as a local vasoconstrictor, and gives temporary relief in proportion as the turgescence in the nose is relieved. The internal or hypodermic use of adrenalin in asthma has been entirely unsatisfactory in his observation. Sprays or nebulized solutions in the nasal cavities act by relieving the pressure on the asthmatogenous areas. Atropine in maximum doses diminishes the reflex excitability of the pneumogastric nerve. This not only gives temporary relief in asthma, but is useful in other conditions controlled by the pneumogastric nerve.

Accessory Sinuses. H. Holbrook Curtis[1] insists that the practice of opening the *maxillary antrum* from within the nose should be attempted before deciding upon a radical canine fossa operation. His procedure is as follows: For fifteen minutes a pledget of cotton, saturated with 10 per cent. cocaine hydrochlorate solution and an equal part of adrenalin

[1] Laryngoscope, May, 1907.

chloride solution, 1 to 3000, is introduced between the inferior turbinate and the antral wall; a smaller pledget is laid over the antral wall in the middle meatus, covering the lower turbinate over its line of insertion. Next, with the turbinectomy scissors, the inferior turbinate is incised for about one inch, as near its insertion as possible, and the piece removed with a coarse snare. There is generally no bleeding to prevent the immediate continuance of the operation. He now injects, by means of a cannula and syringe, a small amount of adrenalin solution with 2 per cent. cocaine into the antrum, if possible, through the natural orifice, or through a small perforation made by a trephine in the inferior meatus wall. By the time the field is free from blood and the remaining part of the cut turbinate trimmed smoothly with Gruenwald's forceps, the adrenalin and cocaine have rendered the lining membrane of the antrum non-sensitive and anemic.

The next step is the fenestration, which is done with an electric trephine, Volkman's spoons and forceps, or, better, with a gouge devised for the purpose. The gouge is constructed with such a curve that it naturally adapts itself to the preferable point of entrance, which is as far anterior as possible, and the edges are so ground on the convexity that, after the entrance of the instrument, one may cut backward by holding the shaft steadily while using the mallet. This instrument takes a tongue out of the wall a quarter of an inch vertically by whatever depth desired. This tongue-shaped piece in removal is pressed into the inferior meatus by the gouge, and is clipped off by appropriate forceps. The fenestration is then made oval in shape by means of the burr drill, cutting spoons, or sickle knives, care being taken to make the lower edge as near the level of the antral and nasal cavity as possible. By the use of appropriate stiff curettes bent at various angles, the cavity may be very satisfactorily cleansed of the major pathogenic impedimenta, and the operator is enabled to ascertain whether the inferior border is free from dental complications. If eroded bony areas are found, with penetrating roots, the teeth must be removed, and this alone will, in many cases, prevent the necessity of a more radical operation. After a rapid curetting of the cavity, it is packed with iodoform wool, which is allowed to remain for three days. The end of the wool should be brought out of the nostril and secured, or else it is apt to get into the pharynx and produce tickling. The further steps in the treatment of the cavity are too well known to require explanation.

R. H. Good,[1] Chicago, describes the following operation as a simple and safe method of entering the *frontal sinus* by the intranasal route: The instruments used are two frontal sinus rasps, two tapering, curved chisels, and three protectors. The operation is performed under local anesthesia, The cocaine crystals are rubbed into the mucous membrane with a cotton-

[1] Journal of the American Medical Association, August 31, 1907.

wrapped applicator, which is first moistened with adrenalin chloride, 1 to 1000, and then this dipped into the cocaine crystals. The entire olfactory region, as well as the bulla ethmoidalis and the unciform plate, are thus anesthetized.

The middle turbinate is then removed by the ordinary method and the processus uncinatus of the ethmoid bone is removed with the larger chisel. A frontal sinus catheter, with syringe attached, is then inserted into the frontal sinus and a half-drachm of a 10 per cent. solution of cocaine and adrenalin, 1 to 1000, is injected into the sinus. A pledget of cotton is placed over the infundibulum for a few minutes to take up the cocaine as it returns from the sinus. The largest possible protector is now inserted into the frontal sinus, and, if the smallest protector will not enter, which is rare, a good-sized probe is used until later in the operation, when the protectors can be inserted. Then, by means of the larger chisel, a part of the processus frontalis of the superior maxillary bone, as well as a part of the spina frontalis of the frontal bone, and the anterior medial wall of the labyrinthus ethmoidalis, are cut through and removed with forceps or curette. The chisel must always be kept in direct line with the protector, so that the tabula interna is not endangered.

The anterior ethmoidal cells are removed with forceps or curette, and by this time the frontal sinus rasp may be introduced into the sinus; if not, the smaller chisel is used to enlarge the opening. When using the small chisel high up, two protectors are inserted at different angles to ensure better protection. The structures to be guarded against injury are the lacrymal bone, lamina papyracea, and the inner lower floor of the frontal sinus. The frontal sinus rasp is now easily introduced and the spina frontalis rasped out, as well as the frontal accessory ethmoidal cells, if present. There is absolutely no danger to the intracranial structures, and the worst thing that could happen would be to rasp through the orbital wall, but this can be avoided by an assistant putting his finger into the orbit. The rasp is directed outward and forward, and care must be taken not to withdraw the rasp too far, as it will damage the septum and cause synechia between it and the outer wall. After this the sinus is curetted with flexible curettes, and all diseased membrane removed. The sinus is packed with sterile gauze soaked in carbolized petrolatum, to which has been added a few drops of oil of cloves.

The packing is removed in twenty-four hours, and nothing further done except the prevention of adhesions between the septum and the outer walls. Good believes that with this method the large majority of frontal sinusitis cases can be cured without resort to the external disfiguring operation. This operation should be done in all cases where an external operation is indicated, as it does no harm, and is of great assistance in diagnosticating cholesteatoma or tumors in the sinus, and, should an external operation be necessary, a good drainage has already

been established of larger size than is ordinarily made when doing the external operation.

PNEUMOCELE OF THE FRONTAL SINUS is a rare condition. Levinger[1] reports a case, of which there have only been two previous cases recorded, one by Hajek and the other by Warren. A man, aged thirty-six years, underwent an operation after the method of Killian for empyema of the left frontal sinus of two years' standing. Healing after the operation was rapid and complete, but about six months later there appeared, on blowing the nose, a large bulging of the frontal sinus region, together with subcutaneous emphysema in the neighborhood. The swelling and emphysema rapidly subsided, but recurred each time the nose was blown. The nasal cavity was free from pus.

An operation was undertaken with the object of producing a firmer scar. What had before been the frontal sinus was again laid open, and was found to be occupied by very loose cicatricial tissue. The walls were scraped with a sharp spoon and the inner angle was packed, the rest of the wound being sutured. The patient was warned not to blow his nose forcibly. Three months later there was no trace of bulging, and the cosmetic result was as good as after the first operation. At the original operation Killian's mucous membrane flap was employed, and thereby the growth of granulations in the region of the frontonasal duct was greatly limited. Levinger regards it as possible that the resulting weakness of the scar may have been responsible for the later trouble.

ENDOTHELIOMATA OF THE INTERIOR OF THE NOSE AND ACCESSORY CAVITIES. Althofi[2] defines endothelioma as a malignant tumor originating from endothelium. He refers to the various points of similarity between endothelium and epithelium, but does not agree with Stohr as to the identity of the two.

An endothelioma often very closely resembles a squamous-celled carcinoma. It is distinguished mainly by the following characteristics: (1) A plexiform structure, resembling lymph channels and spaces. (2) The cells are oval and possess an easily stained nucleus. As compared with cancer cells they are remarkably uniform in both size and shape. (3) Although cell-nests are present, they contain no horny substance; no intercellular bridges, and no prickle cells are found. (4) The tumor appears to grow largely by the conversion of the cells of neighboring tissue spaces into tumor cells, and in some cases the actual point of transition may be discovered. (5) The nuclear mitoses are different from those of cancer cells. (6) In a few cases fine connective tissue fibers are found passing in between the individual tumor cells—a point of resemblance to sarcoma. (7) The tendency to metastasis is very slight, and the rate of growth in some cases extremely slow.

[1] Arch. f. Laryngol., vol. xix, Pt. III.
[2] Ibid., Pt. II.

Althoff was unable to find records of more than nineteen cases of endothelioma of the nose and accessory sinuses. He describes three cases of his own, in which the growth was of large size, and all of which terminated fatally. Microscopic examination showed in all cases well-marked plexiform arrangement; and although in only one case could the actual conversion of the cells of the lymph spaces into tumor cells be made out, yet in all the intimate relations between the tumor cells and the connective-tissue stroma strongly suggested that the former had originated where they were found, and had not reached their position by immigration. He could find no previous description of certain very striking gland-like structures, which were present in one of the cases. In two of the patients symptoms had existed for a period of only four weeks and two months, respectively; while in the third case the disease appeared to have been present for twenty-three years.

Operative Treatment of Malignant Growths of the Nose. Denker[1] reports two cases of malignant endonasal growth, treated by an operation which he has recently devised. The method consists essentially in a further extension of the radical operation which he employs for chronic empyema of the antrum. Exposure of the canine fossa is effected by an incision through the mucous membrane and periosteum at the reflection from the cheek to the gum, and this is followed by a somewhat extensive removal of the facial wall of the antrum. The entire mesial wall is then taken away, and free access is thus obtained to the ethmoid cells and the sphenoidal sinus. After removal of the growth the oral wound is closed and subsequent treatment conducted through the nose.

The first case was one of malignant endothelioma. The growth was extensive and had produced prominence of the whole left cheek, with a fluctuating swelling beneath the inner canthus of the left eye. The hard palate was bulged downward, and the entire left nasal cavity was filled with the growth. At the operation the tumor was found to have arisen from the middle ethmoid cells and to have caused very extensive destruction. A small portion of the dura mater of the anterior fossa, immediately in front of the optic chiasma, was exposed. Recovery was rapid and complete, and no recurrence had taken place seven months after operation. The microscopic appearances of the growth were those of endothelioma.

The second case was one of medullary carcinoma. The tumor filled the whole of the right nasal cavity. The facial wall of the antrum was reduced to the thinness of paper and a part of the mesial wall had been destroyed, as had also the bony and a portion of the cartilaginous septum. The growth arose from the posterior ethmoidal region. During the removal of the tumor masses from the roof of the nasal cavity the dura mater of the anterior fossa was torn to an extent of 1 cm. The disease seemed

[1] Arch. f. Laryngol., vol. xix, Pt. III.

to have been completely extirpated, but death from meningitis ensued thirty-six hours after operation.

The author compares his operation with those which involve skin incisions. He claims that with his method the risk of aspiration pneumonia is diminished and all disfigurement is avoided. This method has also been successfully employed by Professor Manasse, of Strasburg, in two cases of endothelioma.

The Nose in Epilepsy. W. Sohier Bryant,[1] from a study of the nasal condition of forty-eight out of a group of segregated cases of epileptic insanity at the Manhattan State Hospital, draws the following conclusions: (1) Epilepsy is a normal symptom consequent on overstimulation of the higher centres of the cord and brain. (2) This overstimulation is largely reflex in its characteristics. (3) The normal nerve reaction may become pathological, even when it is irritated by a comparatively insignificant peripheral stimulation. (4) Epileptic seizures are more often due to reflexes from the Schneiderian membrane through the fifth nerve than to other causes. (5) Appropriate treatment of the intranasal defects may be expected to lessen greatly the number of attacks, and, in favorable cases, to remove wholly the peripheral irritating cause of the epilepsy, which will allow cessation of the seizures. (6) In the epileptic neurosis, predisposition or weakened resistance of the central nervous system is due to other causes than the slight exciting peripheral irritations which have previously lessened the self-protective power of the higher nerve centres.

LARYNGOLOGY.

Improved Methods in the Successful Operative Treatment of Cleft Palate. —After considerable experience with the various forms of operation and obturators, John B. Roberts[2] has come to certain definite conclusions, which he describes as follows: The view that operations on fissures of the palate should be delayed until the child has become two, three, or four years old is erroneous. It is better to operate when the infant is only a few days old, unless there be some very grave physical debility. In that event the operation may be delayed a few weeks, but such a delay is a misfortune. The time thus occupied in building up the infant's health may be profitably employed in digital compression, applied daily to the two halves of the upper jaw. Squeezing the separated segments of the hard palate together a few times every morning and evening will tend to lessen the breadth of the cleft and give the surgeon a better opportunity of obtaining a bony roof to the mouth by operation. Better than this, however, is operation a day or two after birth.

[1] Medical Record, November 23, 1907.

[2] American Journal of the Medical Sciences, July, 1907.

Roberts believes that the proper course will usually be to adopt the method of Brophy, who, by means of long needles, carries strong wires through the two upper maxillary bones above the level of the palate. The ends of these wires are passed through holes in leaden plates, placed on the external or buccal surface of the bones. After the two parts of the hard palate have been forced as near together as possible by the surgeon's fingers, the adjoining ends of wire are twisted, and the bones thus held in the new position. This procedure causes the loss of but a few drops of blood, gives rise to little or no surgical shock or pain, and has the inestimable advantage of restoring wholly or in part the normal width of the defectively united roof of the mouth. Even if the two upper maxillary bones cannot be brought absolutely together, much is gained by diminishing the width of the cleft in the upper jaw. If restoration of the oral roof is not done thus early, the sucking and chewing by the babe and future child perhaps tend during the first years of life to increase the width of the palatal fissure.

After the use of the wire tie-beams, as they may be called, for about eight weeks, mucoperiosteal flaps from the oral surface of the palate may be used to close any remaining gap in the hard palate, and the soft palate may be closed by refreshing and suturing its edges, which now lie comparatively close together, or by using flaps of mucocellular tissue, as in Lane's operation. In narrow clefts the soft palate may be sutured at the time the wires are introduced to bring the two halves of the bony plate together. The closing of any gap left, after all that is possible has been gained by the Brophy operation, is usually effected by mucoperiosteal and mucocellular flaps made and sutured after the manner of Lane. This method is also to be employed, without preliminary osteoplastic procedure, in patients in whom the operative treatment has been postponed until the child is over five or six months old, and in cases in which the cleft involves only the soft palate.

One should not be tempted to operate on the harelip, if this co-exist, before treating by operation the palatal deficiency. It was formerly a common practice to correct the labial deformity early in infancy, and postpone the operation on the roof of the mouth for several years. This is an error. The great improvement in the physical appearance of the child resulting from the closure of the harelip is admitted. It is much more important, however, to close the roof of the mouth as soon after birth as possible, in order that the nasopharynx and accessory sinuses of the nose may be developed by the pressure of inspired air. The whole facial appearance of a growing child is changed by the direct and indirect influence of this conversion of a mouth-breather into a nose-breather. An additional result may be expected from closing the opening in the oronasal partition of the baby. It is the avoidance, to a great extent at least, of the catarrhal rhinitis and nasopharyngitis so common in cleft palate patients. Closure of the lip does not effect these desirable im-

provements in the child's health and facial contour; and, if done before the palate operation, it is, in a sense, detrimental, because it interferes somewhat with the necessary uranoplastic manipulations by lessening the ease of approach to the operative field. The proper course, therefore, is to close the palate first and to operate upon the lip subsequently. The two operations at times may be done under the same anesthesia, or the labial operation may be delayed a couple of months. When the cleft palate patient is over six months old it is difficult, if not impossible, to press the two separated upper jaw bones together, so as to close or diminish the intervening cleft. The cartilaginous character of the newborn baby's skeleton is lessened at that age by increasing deposition of inorganic salts.

The exact age at which the bones become too rigid for successful displacement varies. In the early weeks of life they may be bent into the desired position without fracture occurring; later they may sustain green-stick fracture through the body of the jaw above the malleolus. In some cases it is necessary to divide the two upper maxillary bones at this point by a horizontal section with a saw. This increasing difficulty of forcing the bones toward the median line, so as to hold them together with wire-beams, is the chief reason for early operation. Brophy maintains that in most cases of cleft hard palate there is no real deficiency in the amount of osseocartilaginous material to form the roof of the mouth, but that the two halves have simply failed to unite and are spread apart. Hence the value of this method of forcing the palatal processes together and holding them in apposition until union is obtained.

The importance of giving the muscles of phonation and the bones of the mouth and nose an early chance to develop and perform their physiological duty will be recognized by all. Delayed operative reconstruction of the palate means progressive atrophy of muscles and other tissues from disuse, and the development of abnormal relations and activities of the parts. When the palatal segments cannot be brought together, even after sawing the bodies of the bones, or when the true physiological time for this operation has passed, the surgeon should close the gap in the bony palate by means of flaps of mucoperiosteum, cut and sutured as suggested by Lane. Lane raises a large mucoperiosteal flap from the side of the fissure, where there is the larger expanse of palatal tissue. This flap is cut with its free convex border at, or actually upon, the alveolar process, and is left attached at the margin of the congenital cleft. On the opposite side a flap is raised which is cut lose from the bone at the margin of the cleft and remains attached, for its blood supply, to the bone near the alveolus. The first flap is then turned over, laid across the fissure in the bone, and tucked under the flap raised on the opposite side of the palate. It is sutured in this everted position by two rows of delicate silk sutures inserted with very small curved needles. The raw surface of the first flap faces the tongue and subse-

quently becomes cicatrized with a pseudomucous membrane. This method of utilizing the flaps has the advantage of covering the gap without much tension of the tissues. In addition, the secretions from the nose have slight access to the suture lines, and, therefore, the suture punctures are not likely to become infected. The raw surface of the large flap is constantly cleaned by the patient's tongue. When the operation is done before the child has developed molar teeth the first flap may be made of extreme width by cutting it from the top and outer side of the alveolar process, as well as from the surface of the palate. It may even extend upon the cheek. It not infrequently happens that the entire palate cannot be repaired at the first operation; but subsequent minor operations, so common in all plastic work, finally complete the reconstruction.

In conclusion, Roberts states that cleft palate should be operated upon as soon as possible after birth. Accompanying harelip should not be treated until after the palate operation. When the operation is done during the first six months of life, Brophy's tie-beam method should usually be adopted. After six months of age the Lane flap method should be generally employed. At times it may be needed as a supplement to Brophy's method in younger patients. Brophy's method for these cases, by means of silver tension sutures and coaptation sutures, with lead splints, or plates, applied to the inferior surface of palate flaps, is also very valuable. Mechanical appliances to close the fissure are inferior to operative treatment, which has a necessary low mortality. Instruction in speech is a necessary adjuvant for satisfactory results.

Another method of dealing with these cases is described by F. N. G. Starr.[1] The technique of the operation is as follows: The child is placed upon a table with a sandbag under the shoulders to throw the head well back, while the surgeon stands to the left of the patient. Hewitt's gag is placed in position and the tongue drawn well forward by means of a silk suture.

The first lateral incision is made well out to the alveolar margin of the hard palate, carrying it beyond the anterior extremity of the cleft, if the cleft does not extend through the alveolar margin. With the periosteal elevator the mucoperiosteum is quickly denuded from this side, then with Lane's curved scissors the palate aponeurosis is snipped from the posterior margin of the hard palate, thus freeing the flap from its bony attachment. The flap should be freed anterior to the cleft. This incision is then packed with a piece of sea sponge, while the opposite side is dealt with in the same manner. The first packing is now removed, when all hemorrhage is found to have ceased. The edges of the flap are then removed with a small tenotomy or cataract knife, making certain to cut as thin a slice as possible, at the same time taking the whole

[1] British Medical Journal, June 29, 1907.

thickness of the flap margin. By the time the denudation has been carried to the anterior angle on one side, the sponge packing from the other may be removed, and denudation proceeded with on the other flap.

While the raw edges are still oozing, and before there is time for mucus to glaze them over, suturing is begun, commencing at the anterior angle and proceeding backward. Horsehair is used, and each suture is passed about one-eighth inch from the margin and from one-eighth to one-fourth inch apart. These are left long until all have been passed, when they may be quickly tied. Lane's needles and needle-holder are used and greatly facilitate the work. Starr then takes a piece of aluminum, gauge 36 in thickness, bends it at an angle where he wants it to fold over the outer side of the flap, and passes it through one lateral incision; then, by passing a pair of forceps into the opposite lateral incision, he grasps the free end and pulls it down into the mouth cavity again, carrying it across to the point at which it entered, where any excess is cut off. With a heavy needle the metal is easily penetrated, at one or two points as required, and a horsehair suture passed through and tied to prevent the free end from scraping and irritating the tongue, or the free end may be turned up into the lateral incision again and pinched with forceps.

The operation takes from twenty-five to fifty minutes. The aluminum is left in for eight or nine days, when it is removed by cutting it across close to the lateral incision, and the stitches are taken out. The lateral incisions then rapidly heal, and the patient may leave the hospital in from ten days to two weeks. The advantages claimed for the aluminum splint are that it prevents tension, and prevents—until union of the edges has occurred—adhesion taking place between the mucoperiosteum and the bone of the hard palate. It also prevents the child sucking the stitches.

Leukokeratoses of the Mouth. Marcel Ferrand[1] prefers the term leukokeratosis to that of leukoplasia to designate white patches occurring on the mucous membrane of the mouth. He describes these with their various causes, of which syphilis is, perhaps, the most important. They are very chronic, may progress slowly, may become papillomatous and fissured, and may become transformed into epitheliomata. The essential point of the greatest practical importance is to recognize the moment of this transformation and to detect at its beginning the atypical epithelial new formation.

Pathology of Keratosis Pharyngis. A. Hamm and H. Torhorst,[2] Strasburg, consider that the evidence brought forward by Siebenmann, and supported by the anatomical and bacteriological studies of Onodi and Entz, is sufficient to prove that the leptothrix is of no etiological importance in keratosis pharyngis. They cannot, however, agree with the view of the last two authorities that the cause of the disease is an

[1] La Presse Médicale, June 29, 1907.

[2] Archiv f. Laryngol., vol. xix, Pt. III.

epithelial proliferation due to slight but repeated inflammatory attacks, since, apart from other considerations, subjective symptoms are not infrequently absent.

Microscopic examination of tonsillar tissue removed from three cases of the disease showed the characteristic cornification of the epithelium lining the crypts, which were much widened by the horny masses. The horny change was not confined to the crypts, but extended over the surface of the tonsil. Instead of the diminution or absence of the cells of the Malpighian layer, described by Onodi and Siebenmann, this layer was found to be well represented, and in places even increased where the horny masses were greatest.

Bacteriological examination of the plugs in each of the three cases showed, in addition to many of the organisms belonging to the ordinary flora of the mouth, numerous leptothrix threads and large numbers of a capsulated bacillus. These authors give the results of a careful study of this bacillus, which they are inclined to regard as responsible for the disease. It is a short, rod-shaped organism, with rounded ends, and is non-motile and sporeless. A prominent feature is the broad mucoid capsule which surrounds it. This capsule, which is well developed under all conditions of growth, stains best by Heim's method or with Giemsa's stain. The bacillus itself is stained by all the aniline dyes, and decolorizes rapidly by Gram's method. It grows easily on all the ordinary culture media, and displays a marked pathogenicity. White mice die of typical septicemia sixteen to forty-eight hours after subcutaneous injection. The power possessed by the bacillus in each of the three cases of forming acid from different kinds of sugar was compared, after the method of Bertarelli, with that of other members of the capsulated bacilli. The result was that the bacillus present in two of the three cases showed, both in this respect and in general cultural characteristics, a close relationship to the Bacillus pneumoniæ of Friedlander and the ozena bacillus, while the organism present in the third case resembled rather the Bacillus aërogenes lactis.

That bacilli not completely identical with one another may be responsible for one and the same disease, the authors would explain by the presence in each case of the broad homogeneous capsule devoid of limiting membrane. Hamm has shown that this capsule consists of nucleoproteid, a substance well known to be an excellent vehicle for the transmission of ferments. The facility afforded by this abundantly secreted mucoid substance for the continuous action of a virulent poison upon the cells of the mucosa is regarded as the probable cause of the keratinization of the epithelium. Agglutination experiments were conducted with a view to deciding the question as to whether or not bacterial products were absorbed into the general system, but were not conclusive.

Six cases of this condition have been reported by Wyssokowicz.[1]

[1] Virchow's Archiv, August, 1907, Nr. 2.

They are characterized by the formation of small, hard, tenaciously adherent, shiny deposits on the mucous membrane of the pharynx. The affection begins insidiously and runs an afebrile, chronic course, without signs of local inflammation. The microscope revealed local hyperproduction of epithelium, with horny degeneration, and almost pure cultures of a peculiar bacillus, which he calls the Bacillus keratosus. Lemon juice was the only measure which proved effectual in the treatment. Siebenmann has reported good results from local applications of alcohol. In one of the cases the affection persisted for eight years.

Vincent's Angina. Bruce[1] reports an interesting case of Vincent's angina, in which the larynx and trachea were involved. The patient was a man, aged forty-seven years, who was admitted to the Southwark Infirmary on January 26. He was suffering from a purpuric rash, mainly on the lower extremities, which had been present, he stated, for about five days. For the same period he had had diarrhea, with some blood in the stools. There was a history of syphilis twelve years before. His temperature was 100.4°. A mild degree of pyorrhea alveolaris was present. He made no complaint of his throat, and the fauces were not examined. On the next day he was seized suddenly with obstruction to respiration. This rapidly increased until complete unconsciousness developed, with twitchings of the extremities, extreme cyanosis, and marked stridor. The obstruction was thought to be due either to the impaction of a foreign body in the larynx or to a sudden edema of the glottis, and, death being imminent, laryngotomy was performed. From ten to fifteen minutes elapsed before consciousness was regained.

A subsequent examination of the fauces showed a sloughing of the uvula and of the edge of the soft palate, typical of Vincent's angina. The characteristic bacilli were present in large numbers in smears taken from the slough, but no spirilla were discovered. The laryngotomy tube had to be retained for five days, at the end of which time the patient could breathe comfortably through the larynx and could phonate, though his voice was hoarse.

Meanwhile, there were a good deal of cough, with expectoration, and a very foul and profuse discharge from the laryngotomy tube. The tissues of the neck around the wound became somewhat swollen and indurated during the first two or three days, and were then attacked by a sloughing process. The skin and subcutaneous tissues, over an area which rapidly increased in size, were converted into a gray fetid material, the surface of which became quickly dry and black. This gangrenous process spread both outward and downward on both sides of the neck, extending on the left side as low as the clavicle. It then ceased to increase and a sharp line of demarcation began to form between the

[1] Lancet, October 12, 1907.

necrosed area and the neighboring tissues. The latter were only slightly swollen and injected. The patient's general condition became steadily worse. Signs of involvement of the lungs developed, with much cough and foul expectoration; the temperature was intermittent, and profuse diarrhea set in toward the end. He died on February 6, eleven days after admission.

At the postmortem examination the uvula was found to have sloughed and to be on the point of separating. The lateral edges of the epiglottis and the edges of the aryteno-epiglottidean folds were covered with a superficial green slough, the edges of the epiglottis being a little eroded where parts of the slough had separated. The mucous membrane of the larynx below the false cords and of the trachea almost down to the bifurcation was covered with the same thin green slough. Several of the rings of the trachea were, in fact, laid bare by the complete destruction of the mucous membrane over them, but with the exception of these limited areas the process was quite superficial. The gangrenous process which had developed in the tissues of the neck was found to have involved the skin and subcutaneous tissues only. There was a little purulent infiltration in its immediate neighborhood. The lungs were very extensively involved in a diffuse bronchopneumonia, with a number of small abscesses.

The extensive area attacked and the development of acute respiratory obstruction are both most unusual features. The involvement of the tissues of the neck in a gangrenous process is also of great interest. The lesion certainly seemed to resemble very closely that which is described as characteristic of the mild form of phagedena or hospital gangrene. The relation between this disease and Vincent's angina was first pointed out by Vincent, who discovered similar microörganisms in both, and it seems fair to presume that in the case recorded the process which developed in the neck was secondary to that in the respiratory tract, and resulted from direct infection of the laryngotomy wound by the discharges from the larynx and trachea.

Notes on Certain Fatal Forms of Pharyngeal Diphtheria. Harris[1] states that there are certain forms of diphtheria in which a fatal termination can with certainty be predicted. The symptoms presented by these cases are as follows: (1) A grayish color of the face, which, in addition, presents an anxious expression. (2) Vomiting, independent of food and unaccompanied by nausea. It presents a similarity to cerebral vomiting. The vomitus is yellow or green. (3) Abdominal pain, referred to umbilicus. No abdominal tenderness. (4) Albuminuria, usually a large amount, but no tube casts. (5) Suppression of urine is the rule in these cases. (6) Alteration in the rhythm of the heart sounds. This appears after the vomiting has set in. One of the heart sounds is reduplicated, producing the gallop rhythm.

[1] Lancet, September 28, 1907.

The patients are generally very restless, and consciousness is maintained until the end. The membrane on the throats in these cases is dark colored, and the odor of the breath is most offensive. Antitoxin has not the slightest effect in these cases, 6000 units being given in each of the eight cases reported. Examination of swabs from these throats showed large numbers of streptococci and staphylococci associated with the Klebs-Loeffler bacilli. Harris does not think that they were responsible for the fatal termination, but suggests the possibility that there are several kinds of diphtheria bacilli which elaborate different toxins, and such toxins will only be neutralized by special antitoxins.

Retropharyngeal Fibroma. Odgers[1] reports the case of a woman, aged thirty-one years, who had been unable to breathe through her nose and had had some difficulty in swallowing for over two years. She had two attacks of epistaxis; there was no impairment of hearing at any time. Apparently the tumor had not increased in size during the last twelve months. On examining the throat, behind the right side of the posterior pharyngeal wall was seen a pyriform swelling, firm, regular, and well-defined; the mucous membrane over it was tense and thin, but not involved. The tumor reached to just beyond the median line; it extended upward to the lower border of the atlas, while its lower limit was determined by the upper border of the fifth cervical vertebra. The soft palate and right posterior faucial pillar were pushed forward and the growth filled two-thirds of the nasopharynx. A finger could be swept all around it, except along its outer border. It was freely movable laterally on the vertebral column, and the mucous membrane was not adherent to it.

A six weeks' course of iodide and mercury had no effect. A longitudinal incision was made through the mucous membrane over the tumor, and the latter was then readily enucleated. Hemorrhage, brisk for an instant, stopped almost immediately, and the mucous membrane was then sutured. Convalescence was uninterrupted. The tumor, when removed, was the size of a hen's egg, and microscopic examination showed it to be an angiofibroma with a more or less definite capsule; the vessels were chiefly capillary, but there were many large venous channels at the periphery. No indications of sarcoma were observed in the sections.

Pathology of Adenoids and Adenoid Tuberculosis. The views recently advanced concerning the pathology of these tissues, especially as to their relation to tuberculosis, are summarized by E. Hamilton White,[2] who also gives the results of his study of 75 cases. In 5 cases histological evidence of tuberculosis was found; in 4 of these the disease was, clinically, primary in the adenoid; in the fifth the adenoid was probably

[1] Brit. Med. Jour., May 25, 1907.
[2] Amer. Jour. Med. Sci., August, 1907.

involved secondarily to a pulmonary focus, and in this case the faucial tonsils were also affected. The percentage of primary adenoid tuberculosis found was thus 5.3 per cent.

The opinion formerly held, that the tonsil and adenoid were rarely affected with tuberculosis, has been shown to be incorrect, though as yet statistics differ as to the frequency and importance of their involvement. This change of opinion has resulted from a more careful and more thorough examination of the tissues. As the type of tuberculosis found is u ually proliferative, rather than destructive, the clinical and macroscopic examinations are of little value, and the methods of diagnosis are histological examination, inoculation of animals, and examination of sections for the tubercle bacilli.

Lewin experimented with tuberculin as a method of diagnosis, but found it unsuitable. He got a severe reaction in many cases in which the adenoid was not found tuberculous after removal. This is explained by the presence of other latent foci, especially in the peribronchial glands. An important distinction is to be drawn between the two classes of cases of adenoid or tonsillar tuberculosis, the primary and the secondary. The primary are such as present no sign of tuberculosis elsewhere which might have been the source of infection, and it is with this class that White chiefly deals.

The frequency of primary adenoid tuberculosis has varied remarkably in the experience of different observers. McBride and Turner, with histological examination, found 3 cases in 100 examined (3 per cent.), but they considered it too low. Dieulafoy, using inoculation, found 7 cases in 35 examined (20 per cent.); Pluder and Fisher, with histological examination, found 5 in 32 cases (15.6 per cent.); Nicholl and Lartigau, by histological and inoculation examination, found 12 in 75 cases (16 per cent.). Wood collected 1671 cases, examined by various methods, and found 88 cases of tuberculosis (5.2 per cent.). This corresponds to the work of Lewin, who found 10 in 200 cases (5 per cent.). In the present series of 75 cases, 4 (5.3 per cent.) were regarded as primarily tuberculous. Primary adenoid tuberculosis is of importance as a latent focus of tuberculosis not recognizable clinically, which may lead to an infection of the cervical glands, or even to a more general tuberculosis.

The result of operation in the primary cases is favorable in every way. The site of the operation heals as usual. The benefit of removing such a focus is apparent, provided always the focus be primary. The interest lies not so much in the result of any individual case as in the demonstration of a primary invasion at this point in the respiratory tract. Although opinion has been strong as to the importance of this channel of infection, the amount of positive evidence has been small. Secondary cases are those which arise in persons with pulmonary tuberculosis, or active tuberculosis elsewhere, and which are regarded as infected by the

medium of the sputum or blood stream. This is of interes chiefly as demonstrating the readiness with which tubercle bacilli are taken up by the tonsils when present on the surface. Formerly thought uncommon, it has been shown to be very frequent. Walsham examined the tonsils in 34 subjects dead of pulmonary tuberculosis; in only 2 had there been anything to attract attention to the tonsils during life, yet in 20 subjects they were found tuberculous. Wood has collected 136 such cases, including those just mentioned, 94 (69 per cent.) being found tuberculous.

From the frequency of these secondary deposits, it is generally held that before a case may be regarded as primary the patient must remain free from signs of pulmonary tuberculosis for at least a year after removal of the tuberculous adenoid. Cases have been reported of patients previously regarded as healthy developing signs of pulmonary tuberculosis shortly after removal of the tonsils and adenoids. The explanation usually given of these cases is that an early or latent focus was already present in the lung at the time of operation, though perhaps escaping notice. The anesthetic and shock of the operation in these cases have probably been sufficient to stir up the activity of the disease. Apart from those in the lungs, other foci are not likely to be sources of infection for the adenoid, unless a general dissemination with miliary tuberculosis occurs. The presence of a tuberculous focus elsewhere does not exclude an independent primary infection of the adenoid.

White draws the following conclusions: (1) Primary tuberculosis occurs in a certain proportion of all cases of adenoids. From the figures of other observers and his own, this seems to be about 5 per cent. This is regarded as a conservative estimate. (2) In determining the presence of adenoid tuberculosis, the histological method is the most satisfactory. (3) Tuberculosis does not appear to be an important factor in the production of adenoid hypertrophy. (4) Adenoids and tonsils are the important channels of infection in tuberculosis of the cervical glands. (5) In the development of pulmonary tuberculosis, adenoids may sometimes be direct channels of infection, but their importance is probably more often indirect, by predisposing to catarrhal inflammations of the upper respiratory tract.

Myxofibroma of the Nasopharynx. I[1] have reported the case of a man, aged twenty-four years, who complained of inability to breathe through his nose and of almost continuous pain in the region of the frontal sinus. On the right side a tumor had extended so far forward as to almost protrude from the nostril, while the left nasal cavity was occluded, owing to the septum having been deflected by the tumor. By rhinoscopic examination the mass could be distinctly outlined in the nasopharynx, although it did not extend below the margin of the soft palate. Marked external deformity was present over the bridge of the nose at the inner

[1] Annals Otol., Rhinol., and Laryngol., June, 1907.

corner of the right eye, which entirely disappeared after the removal of the tumor. There was no involvement of the accessory sinuses of the ear.

The points of interest in this case were: (1) The site of origin of the pedunculated masses, at the posterior end and underneath the superior turbinated body. (2) As a rule, the tumor extends downward into the nasopharynx, but in this case only one of the tumor masses extended into the nasopharynx, while the others turned forward and completely blocked the right nostril, and by their gradual increase in size had displaced the bony septum to the left, occluding the nostril. (3) The growths did not follow the line of least resistance. (4) There was practically no hemorrhage. (5) Each tumor was pedunculated. (6) There was no involvement of the ear. (7) There was no evidence of sinus involvement except the pain, and after the removal of the tumor this entirely disappeared.

The right nostril was completely blocked by the new-growth, and there was marked disfigurement at the inner angle of the right eye. The patient suffered considerable pain over the region of displacement and swelling. After the removal of the growth the finger passed into the nasopharynx could be carried forward through the enormously dilated nostril. The bony septum seemed to have been softened by the pressure and inflammatory process, and was easily forced back into the median line, and remained without the support of nasal splints.

Hypopharyngoscopy. Carl von Eicken[1] describes a new method of inspecting the laryngeal part of the pharynx, or the hypopharynx, which he terms hypopharyngoscopy. After careful cocainization of the fauces, root of the tongue, and the larynx, the patient is seated on a high chair, while the surgeon kneels down before him. This position is chosen because the patient must incline the head forward in order to release the muscles on the anterior side of the neck; these muscles thereby become unable to contract, and so prevent the surgeon from pulling the larynx forward away from the vertebral column. At the same time the inclined position of the head of the patient obliges the laryngologist to kneel down, as it becomes necessary for him to look from below upward at the laryngeal mirror placed in the usual way against the soft palate.

Next, a strongly built laryngeal probe of somewhat greater dimensions than the ordinary ones is introduced through the rima glottidis down into the subglottic space, and the larynx is pulled slowly in the direction forward and upward, the proximal straight part of the probe resting against the upper teeth. so that the probe acts as a lever. In the laryngeal mirror it may then be observed that the larynx is drawn one and a half to two centimeters away from the posterior wall of the pharynx, the two pyriform recesses join into a common cavity, and in the depth the entrance to the gullet is seen closed by the constrictor pharyngis inferior.

[1] Arch. f. Laryngol. und Rhinol., 1907, Band xix, Heft 2.

Often a faceting of the lamina of the cricoid cartilage is visible through the mucous membrane, laterally to a median prominence. Occasionally it is also observed how that part of the mucous membrane that is loosely extended over the lamina of the cricoid cartilage and its muscles becomes drawn out to a fold stretching backward when the larynx is lifted away from the posterior wall of the pharynx; when the pull becomes stronger the fold disengages itself from the posterior wall of the pharynx and sinks back in a level with the rest of the mucous membrane on the lamina of the cricoid cartilage.

Subglottic Stenosis Produced by Amyloid Infiltration. Strazza[1] reports a case of this unusual condition. The patient was a man, aged fifty years, in whom the phenomena of stenosis of the respiratory tract had developed slowly after an attack of influenza. Laryngoscopic examination revealed considerable narrowing of the subglottic space, apparently caused by diffuse infiltration of the whole of the mucous membrane; there being no immediate danger, tracheotomy was put off until the next day; during the night, almost without the nurses observing it, the patient died.

On postmortem examination there was no degenerative change in either the abdominal or pulmonary organs; there was simply an enormous uniform hyperplasia of the cricoid region and of the upper rings of the trachea, which was in the shape of a narrow elliptical funnel. There were evidences of acute exacerbations of tracheitis and bronchitis.

The histological examination of the tissue which caused the stenosis showed that there was an old-standing change in the deeper layers of the mucous membrane, followed by an intense amyloid infiltration, which constituted the greater part of the tumefaction. The most superficial parts of the mucous membrane were normal, and in them the constituent elements, the glands, were affected by a marked necrobiotic change, resulting from the compression exercised by the amyloid mass. Strazza draws attention to the rarity of the case, because, up to the present, amyloid degeneration has been described only as found in small fibromata or other tumors. Photographs are shown of the pathological specimens and of numerous microscopic preparations which confirm his description in every detail.

The Larynx in Locomotor Ataxia. W. G. B. Harland[2] examined the larynx in 24 patients with tabes dorsalis, with the view of ascertaining the frequency of laryngeal involvement. Practically nothing of great interest was discovered. In 12 cases the left cord was found hyperabducted during respiration, its movements restricted during phonation; the ventricular bands had lost their tonicity and were flabby. In 2 cases the right cord was thus affected, but not the left. In none of the cases was there any evidence of loss of sensibility. All the patients

[1] Abstract, Jour. Laryngol., Rhinol., and Otol., September, 1907.
[2] Jour. Amer. Med. Assoc., September 14, 1907.

suffered from chronic nasopharyngitis of various kinds and degrees, and the condition of the larynx was what one might expect to find in the average individual of this age and class of life. No constant lesion was observed except hyperabduction of the vocal cord, which was present in 70 per cent. of the cases. Harland was unable to find a tabetic case with laryngeal crisis. His conclusions are: (1) The larynx is very seldom seriously affected in locomotor ataxia. (2) Rarely, early in the disease, spasmodic abductor paralysis may sometimes arise, and should suggest to the laryngologist the possibility of tabes as its cause. (3) Late in locomotor ataxia one or the other cord (generally the left) is often in a hyperabducted position.

Scleroma of the Larynx. Emil Mayer[1] reports a case of this unusual affection, which he believes to be the first case of scleroma beginning *de novo* in the larynx published in North America. The patient was a Slav from Poland, sixteen years of age, female, and well until three years ago. She became hoarse on the journey from Poland to America. The mass was subglottic below the right cord, protruding into the larynx, diminishing its lumen by about one-half, and having a grayish appearance. The masses when removed were pale, translucent, and resembled soft adenoid tissue.

The pathological report was that of scleroma, and pure cultures of a mucoid, Gram-negative, capsulated bacillus, belonging to the Friedlander group, were obtained from the freshly cut sterilized surfaces of the growth. Mayer finds, from his investigation, that scleroma is a chronic incurable affection, contagious to a certain degree. There are probably many more cases than the large number that have been recorded. It therefore seems advisable that the sanitary authorities take appropriate action while the cases are comparatively few in number. The disease is not more dangerous than leprosy, as Streit has asserted, but it is now quite within the control of the sanitary authorities. Every quarantine officer should look upon undoubted cases of *rhinoscleroma* as infectious, and the subjects thereof should not be allowed to land but be deported at once. In addition, every case of long-standing hoarseness, with or without dyspnea, especially when associated with chronic catarrhal conditions, should be detained until such time as some expert authority can determine the presence or absence of scleroma.

Epithelioma of the Larynx. Harold Barwell[2] reports an interesting case of epithelioma of the larynx in a young man. The patient was a hawker, aged twenty-seven years. He came to the Throat Department of St. George's Hospital in June, 1906, complaining of gradually increasing difficulty in swallowing, together with shortness of breath. These symptoms had been noticed for about two months; the dysphagia was not extreme; there was some inspiratory stridor on deep in-

[1] Amer. Jour. Med. Sci., May, 1907.

[2] Brit. Med. Jour., May 25, 1907.

spiration, but the voice was very little affected, being only slightly hoarse. He was unable to work on account of the dyspnea, which came on with active exertion, but otherwise his general health was fairly good; he denied syphilis, and no signs of the disease were to be discovered. The cervical glands were not enlarged, but a slight fulness could be detected about the right ala of the thyroid cartilage. On examination of the larynx, a large, rounded swelling was seen to occupy the right lateral wall; internally it filled a large part of the lumen of the larynx and concealed both vocal cords, while externally it bulged into the right pyriform fossa and vallecula. It was situated below the level of the right aryteno-epiglottidean fold, which projected above the mass and appeared in the mirror to bisect it.

The diagnosis appeared to lie between gumma and perichondritis of the thyroid cartilage. He was, therefore, given mercury and potassium iodide, the latter in doses of 30 grains three times a day. Under this treatment the dysphagia improved, but the tumor did not alter appreciably in size, and the patient reported several attacks of dyspnea, the last of these being so severe that he was admitted to the hospital on August 28, and tracheotomy performed. He was then given intramuscular injections of benzoate of mercury on alternate days, in doses of $\frac{1}{3}$ to $\frac{1}{8}$ grain, and at the same time a considerable part of the growth projecting into the larynx was removed; this relieved the dyspnea, so that a plug could be worn continually in the tracheotomy tube, but the main mass of the tumor appeared slightly larger, and the swelling in the neck over the thyroid cartilage was more apparent; antisyphilitic treatment was, therefore, discontinued.

Microscopic examination of the tissue removed showed only normal tissue in a state of chronic inflammation, and there was no sign of either tubercle or new-growth. On December 5 an incision was made in the external swelling in the neck, which was now tense and fluctuated; a large cavity was found beneath the perichondrium, communicating by an opening in the right thyroid ala, large enough to admit the finger, with a similar cavity within the larynx. The entire cavity was filled with pale, friable material, resembling granulation tissue, but there was no pus; the cavity was thoroughly evacuated and curetted, and a tube inserted. In a few days both the drainage tube and the tracheotomy tube were removed, and both wounds healed rapidly; there was now no dyspnea, but considerable swelling was still visible with the laryngoscope. Examination of the material from the cavity showed the case to be one of epithelioma.

On January 28, 1907, after a low tracheotomy, the right half of the larynx, with the epiglottis, were removed. The operation was rendered difficult by the size of the tumor in the neck and the scars of the former tracheotomy and exploratory incision; his condition remained satisfactory until the sixth day, when there was a sudden rise of temperature,

and he died on the eighth day, of pneumonia. The points of special interest in this case were the age of the patient and the deep situation of the neoplasm in relation to the question of the intralaryngeal removal of portions of the growth for examination. A considerable portion of the mass which projected into the larynx was removed to relieve the dyspnea, and the microscopic examination showed that only normal tissue was included in the section, and no sign of malignant growth, or, indeed, of any neoplasm, could be detected.

TRYPSIN IN LARYNGEAL EPITHELIOMA. H. Dupuy[1] reports favorable results from the employment of trypsin in laryngeal epithelioma. His patient was fifty-nine years of age. The disease had existed for about six months. The growth involved the anterior third of the right true and false vocal cords. The involved structures were excised, and the point of origin, the right ala of the thyroid cartilage, thoroughly curetted. One month later the growth recurred on the opposite side, and although a laryngectomy was decided on, trypsin injections were first given. This treatment was continued until the patient had received 1100 minims of trypsin, hypodermically, during a period of about five months, when the tumor was no longer visible. There had been no recurrence after two months.

TRYPSIN TREATMENT OF A CASE OF MALIGNANT DISEASE INVOLVING THE LEFT TONSIL, BASE OF TONGUE, AND EPIGLOTTIS. James T. Campbell[2] concludes from the relative distribution of cancer of the alimentary tract that the pancreatic ferments and bile salts might be supposed to have an inhibitory or preventive action on cancer. He reviews the experimental work of Beard upon mice infected with Jensen's mouse tumor, in which the injection of trypsin was used with marked effect upon the tumor. Beard's recommendations as to the proper method of administering *injectio trypsini* and *injectio amylopsini* in human beings are given, and the encouraging results of this method as used by William J. Morton in 29 cases. Campbell then reports at some length his experience with *injectio trypsini* and *injectio amylopsini* in treating what was apparently an inoperable carcinoma of the base of the tongue, left tonsil, and epiglottis. The improvement was marked, pain subsided, and swelling and induration were greatly reduced in the seven months preceding the report. Unfortunately the diagnosis of carcinoma was not confirmed by microscopic examination.

Thymic Tracheostenosis. Chevalier Jackson[3] has demonstrated on the living patient, with the aid of the bronchoscope, the purely mechanical nature of "thymic asthma" in one instance. This does not prove that every case has this same pathological mechanism, but it does prove the occurrence of that which many, including Friedleben, von Kundrat,

[1] New Orleans Med. and Surg. Jour., July, 1907.
[2] Laryngoscope, February, 1907.
[3] Jour. Amer. Med. Assoc., May 25, 1907.

d'Escherich, and Paltauf, have denied, namely, that a hypertrophic thymus can compress the trachea sufficiently to obliterate its lumen. In view of the tracheoscopic findings, it is easy to understand sudden deaths from thymic hyperplasia, for it is well known how suddenly the end comes in any form of tracheal stenosis, and how impossible it is to get respiration started after it has stopped when there is even slight obstruction, unless tracheotomy be immediately performed, and in these thymic cases a long cannula reaching below the obstruction would have to be inserted. With the tracheal lumen diminished to a chink, the slightest engorgement, as from cough, would be sufficient to cause temporary swelling and momentarily to shut off the passage of air. Once the air is shut off the usual phenomena of asphyxia is sufficient to engorge the thymus gland and all the vessels passing through the upper thoracic opening, which prolongs obliteration of the tracheal lumen until death supervenes. Then the recession of the blood and the sagging of the viscera, together with the usual autopsy technique, would serve to allow the trachea to assume its normal lumen. Thus the pathologist finds the gland hypertrophied, but not compressing the trachea.

Jackson gives a detailed report of his case, which is the seventh on record, of the cure of thymic asthma by thymectomy; the first case demonstrated radiographically, and the only one in which the mechanical pathology of the disease was proved by direct tracheoscopic examination of the living patient. He concludes as follows: (1) Friedleben's dictum, "es giebt kein asthma thymicum," is an error. The thymus gland in this case did compress the trachea sufficiently to diminish and to obliterate momentarily its lumen. Thymic tracheostenosis seems a better term for this class of cases. (2) The dyspnea in thymic tracheostenosis is worse in the erect position, and it is expiratory, as might be expected from the increased intrathoracic expiratory pressure, and as demonstrated tracheoscopically in this case. The mechanism of this was demonstrated by the flopping out and in of the elevated gland before it was severed. (3) A radiograph is a valuable diagnostic aid. (4) An absolutely positive diagnosis can be made with the tracheoscope. Upper tracheoscopy is probably not safe in these cases. Tracheotomy should be done under infiltration anesthesia, and should be high, so as to be as far as possible away from the thymectomy wound. (5) A long trachea cannula, reaching to within 0.1 cm. of the bifurcation, renders breathing free and the thymectomy safe from risk of asphyxia. (6) Thymectomy is indicated, and best done by the insertion of the little finger from above downward behind the sternum through a transverse incision after double sternocleidomastoid tenotomy. The insertion of the finger should be of brief duration, as, though the patient with the long cannula inserted is safe from asphyxia, there seems to be serious cardiac inhibition, probably from compression of nerve trunks about the esophagus. One should be careful not to injure the pleura. (7) An almost complete thymectomy is without effect on either the blood or nutrition.

Tracheal Diphtheria. H. Herzog[1] reports the case of a child, about three years old, who coughed up the intubation tube half an hour after its first introduction, bringing with it the membrane drawn over the tube like a cot, more than six and one-half inches in length. This relieved the child at once, but intubation was necessary again in ten hours, and a second time the tube was coughed out in one-half hour, bringing with it a membrane clot nearly six inches long. The procedure had to be repeated again fourteen hours later, when the tube was coughed up almost immediately, bringing a third membrane tube nearly six inches in length, after which the child rapidly recovered. The antitoxin treatment evidently loosened the membrane, and it was also probably responsible for the rapid recovery after the severe diphtheria.

Bronchial Diphtheria. Bellamy[2] reports an interesting case of diphtheria, in which the bronchi were primarily affected. The patient, a boy aged eight years, after a few days of general malaise, developed a nasal catarrh, slight cough, and sore throat; he then gradually lost his voice, had occasional attacks of epistaxis, and was unable to breathe through the nose. On the tenth day he was examined. The skin was very hot and flushed, pulse 102, and temperature 101.4°. A serosanguineous discharge came from both nostrils, and nasal breathing was obstructed owing to turgescence of the mucous membrane over the turbinals. The pharynx was red and congested, the enlarged tonsils showing a few whitish-yellow follicles; the soft palate and uvula were only reddened. Owing to extreme reflex irritability, the larynx could not be examined. Except for harsh, prolonged expiration, the lung sounds were normal. The urine was albuminous.

The same evening the soft, toneless cough became very troublesome, and, finally, the patient coughed up two separate white, fibrinous casts, apparently of the two main bronchi, which caused immediate relief of the dyspnea and cough. Each cast was about three inches long, one-third inch in diameter, hollow, and thin walled, but of firm texture, and slightly streaked with blood. Thirty-six hours later he coughed up a third cast about four inches long and of exactly similar appearance to the first two. Serum treatment was at once instituted, 4000 units being injected every twenty-four hours for five days; after this all symptoms gradually abated, and the patient made an uninterrupted recovery, although the voice was not completely restored for many weeks, and for three weeks the heart was rather irregular and the first sound at the apex somewhat muffled. The only sequel was a bilateral paralysis of the ciliary muscle of the eye, which, treated with eserine, cleared up in a month. Cultures made from the casts and from a throat-swab showed the Klebs-Loeffler bacilli. Bellamy thinks that the casts did not result

[1] Deutsche medizinische Wochenschrift, xxxiii, Nr. 20.
[2] Brit. Med. Jour., June 29, 1907.

from an extension of membrane from the larynx, but were of primary formation, for throughout the attack there was, beyond the aphonia, no symptom of involvement of the larynx. It is also interesting that the formation of membrane caused no secondary bronchitis or bronchopneumonia, which so generally results from an extension of laryngeal diphtheria downward.

Voice. In an article on "The Acoustics of the Mouth and the Relation of the Individual's Voice to Hearing," I[1] have pointed out that the various methods used in training the voice are necessitated by pathological alteration involving some portion of the speaking tract. It is of the greatest importance that the teachers of elocution and music should thoroughly understand these irregularities, and the very fact that different teachers strongly and urgently uphold different methods proves the existence of such irregularities.

If the formation of the vocal apparatus was always normal, there would be no necessity for methods. This explains why some methods are successful in some individuals and failures in others. The use of the facial muscles in a variation of tone is merely the power to expand the walls of the building, increase the volume, and lessen the resistance of the tone. The power to expand the walls of the building increases the space of outlet, and enables the individual to have a larger compass of voice.

Voice production requires the use of a complicated mechanism, *i. e.*, the so-called musical ear. Through conscious or unconscious cerebration there is called into action for voice production three anatomical factors: the lungs, the larynx, and the resonance tube. The resonance tube consists of all structures above the vocal cords, and includes the vestibule of the larynx, the pharynx, the tonsils, the posterior nares, the anterior nasal cavities, the accessory sinuses, especially the antrum of Highmore, and the mouth. It is this resonance tube that, after tone is produced, modifies or aids the fulness, the smoothness, the roundness, the power, the sweetness and beauty of the voice. It is in this tube that the sounds produced in the larynx are reënforced, and it is in this same resonating tube that these sounds may be distorted and converted into rasping, disagreeable tones.

Now, if the three essential anatomical factors, namely, the lungs, larynx, and resonating tube, are proportionate then the tones coming from the larynx, being modified by the perfect resonator, unite and modify each other. If, however, there is any disproportion, this resonator acts as a distorter of sounds. It is like a tenor string on a bass violin; it is a misfit. If all parts work harmoniously, that individual is gifted with a natural voice, and is a natural singer requiring only careful education and practice to make perfect execution; but, when such harmony

[1] Laryngoscope, June, 1907.

does not exist, where diseased conditions or imperfectly developed parts in the voice apparatus do exist, it is then that the teacher of music must differentiate the condition, as one will require a method and the other merely execution.

Volume, tone, and timbre are controlled by the size of the lungs, the larynx, and the resonance tube. Their loss, then, may result from (1) disease of the lungs, bronchi, or trachea; (2) the larynx with its innervation, not only local lesions, but lesions elsewhere; (3) diseases of the pharynx and tonsils; (4) diseases of the nose, including septum and antrum. Each voice has its individuality; in fact, our voice is a part of our individuality. Tone production, timbre, or quality and resonance, together with execution, do not repeat themselves in the same manner in two individuals. This is especially marked in singers. As to the question, then, of the acoustics of the mouth in its relation to the voice, the upper part of the resonating tube—the mouth, the tongue, the hard and soft palate, nasopharynx, nostrils, and accessory cavities bear the same relation to the voice as the building does to the speaker. The voice may be produced correctly, but its quality is lost in faulty acoustics. The building may be beautiful architecturally, but its acoustic properties poor. The decorator may improve the acoustics of the building; so may the laryngologist and rhinologist improve the acoustics of the mouth, by correcting faulty conditions, that interfere with perfect resonance. For example, the removal of enlarged tonsils, nasopharyngeal growths, correction of nasal obstruction, etc.

Again, in some cases, certain pathological conditions may improve the acoustics. One of our famous singers has abnormally large tonsils—in fact so large that when the tongue is protruded and the muscles of the larynx made tense, the tonsils project so as to meet in the median line; yet, when the individual sings, by depressing the tongue, the tonsils fall into lateral cavities of the pharynx, the patient having an unusually wide pharynx, with concave walls. In this position, then, the tonsils offer no obstruction to sound in the resonating tube, while the removal of these tonsils would entirely alter the walls of the building, and would also alter its acoustic properties.

The relation of the voice to hearing, and the control of the voice by hearing presents an interesting subject for discussion and study. Voice is not hearing; we also have voice in the absence of hearing, yet hearing is really a controlling element in the production of voice. The relation of our own hearing to our individual voices is illustrated in our speaking and in singing.

Our voice to us is what our ears indicate. As to hearing, this necessitates two classifications, namely, *subjective* and *objective* hearing. By subjective hearing we mean the individual's subjective sense of sound-perception; in various lesions of the ear, with the various noises heard by the patient, that is subjective; his sense of sound-perception of his own

voice is subjective. However, in noises of the ear, which are usually only heard by the patient, we can form no comparison because the observer cannot hear the noise. As to his own voice, we can compare his subjective sense of sound-perception with that of the observer. The individual's subjective sense of sound-perception is determined purely by external sounds. As to whether this is normal or abnormal he can easily determine by comparison with the external objective sense of sound-perception of others.

The training and cultivation of the voice under the guidance of a teacher, to be sure, is a great factor in the success of the individual as to his speaking or singing voice; however, one of the greatest difficulties the instructor often has is to convince the pupil that his voice is wrong. The pupil's own ears tell him that it is right. A musical ear does not always mean a musical voice. Some individuals cannot sing or play, and yet the slightest discord in the human or orchestral tones will be detected instantly by such a person's hearing. Again, certain individuals may have a musical voice as far as conversation or speaking is concerned —I say musical, meaning a pleasing tone—yet such individuals cannot sing, and their ear will not tell them whether they are in cord or discord. If, however, they are attempting to sing with others their ear will tell them if the voices do not harmonize; yet they cannot control it, as their ear does not seem to indicate to them that fineness or distinction of tone which permits of harmony. The alteration in the individual's voice, where the hearing has become defective, is so marked as to become almost characteristic, although there are exceptions to this. I have seen a number of cases in which the patient was so deaf that he could not hear conversation even in the very loudest tones, yet there was practically no alteration in the voice, but this is, indeed, the exception.

The deaf and dumb may be taught to speak, yet the voice produced is unnatural and not altogether pleasing. The hearing, then, associated with the voice acts as a regulator; defective hearing may mean altered voice. It often falls to the lot of the laryngologist to examine the throats of singers or would-be singers, and many times the instructor of music, having used all his methods and means to train a certain voice, finally appeals to you to determine what is the matter. The pupil is thoroughly convinced that he can sing, and to his ear he can sing, but, unfortunately, to the nine hundred and ninety-nine listeners, his subjective sense of sound-perception is faulty. These cases are, indeed, pitiful. I do not mean that we do not have some cases who think they can sing in spite of their hearing and voice. These facts must be taken into consideration by the elocutionist and the teacher of music.

Another extremely interesting fact illustrating the relation of the voice and hearing is this: In the first place, few of us accurately describe our voices so that the voice would be recognized by anyone else. Frequently we hear individuals discuss voices, either speaking or singing,

and, while seven out of ten might agree that the voice was pleasing, melodious, soft and sympathetic, and possessed the many other attributes necessary in a successful singer, yet the remaining three of the ten would find fault, some rasping note, something not pleasing, showing that the objective sense of the sound-perception varies greatly in individuals.

Frequently individuals are criticised for their loud tone of voice. Individually they may be charming, but their loud tone of voice frequently attracts attention. Did it ever occur to you that this individual himself did not know that he was speaking in such a loud tone of voice? I know this is true, as I have interviewed several such persons who had been taken to task for their loud tone of voice. When I would have them lower their voice to an ordinary pleasing conversational tone, they assured me that to them it sounded as though they were speaking scarcely above a whisper, showing that their ears for their own voice were not so sensitive as for outside sounds. In such individuals the subjective sense of sound-perception was decreased or below normal while their objective sense was normal. On the other hand, some individuals who use a quiet, soft, low tone of voice, to their own ears it sounds as if they were speaking in a very loud tone of voice. In such individuals their subjective sense of sound-perception is extremely sensitive or exaggerated. Just as objective sense to sound may vary, so does the subjective sense vary.

The effect of drugs and stimulants also illustrates the peculiar relation of the individual's voice to hearing, in that certain drugs or stimulants may exaggerate the two conditions which I have just described. The man with the defective loud voice talks louder, and the man with the defective low voice finally speaks so low that you can scarcely hear him. The jerky, irregular voice of a deaf person is another index or evidence of the peculiar relation of the voice and hearing. Without hearing, of course, there is no sound, but the voice is more than sound, and the voice to the individual, or rather the individual's voice to himself, is exactly what his ear tells him it is, and if there is any loss of harmony between these two, then he will have defective voice, yet, in response to all the tests of hearing, he shows normal reaction.

Some time ago, in training a young man whose voice had not changed at puberty, I succeeded, by the use of the falsetto voice, in working his voice down to a perfectly natural tone, and, after having him speak in that one for a few minutes, his face assumed an anxious expression and he said: "Will that be my natural voice; for to me it sounds frightfully strange and unnatural?" His ear had not been trained to that sound.

Pathological alterations of the structures of the nasopharynx, whether due to local or systemic changes, will produce subjective and objective alterations in the sound-perceiving apparatus. The objective one can be determined by tests, while the subjective ones can only be described by the individual. The tinnitus associated with any such alteration, no

matter what form it may assume, is heard only by the individual, except in rare pulsating cases, and it cannot be detected by the observer, although frequently subjective sounds are so intense that the individual thus affected can scarcely realize that the sounds cannot be heard by the observer. The involvement of the apparatus of subjective sound-perception, especially of the inner portion of the orifice of the Eustachian tube, will give to the patient the sensation of altered voice common in singers. To the audience their voice is in perfect form, while to their own ear the voice sounds muffled; in other words, the subjective perception is interfered with, while the voice is in perfect form. At the same time this individual may not show any defective, objective sound-perception. In objective sound-perception the external ear is the collector of sound, while the drum membrane and ossicles of the middle ear are the transmitters of sound; in subjective hearing this condition is partially reversed, the Eustachian tube partially taking the place of the external ear.

Sound is what we hear; our perception of sound depends on whether it is subjective or objective, and our description of sound will depend on the condition, subjective and objective, of our sound-perceiving apparatus. The deaf-mute has no conception of perception of either subjective or objective sounds. Voice is sound, speech is voice in action; the impression made by voice and speech will depend entirely upon the condition of the sound-perceiving apparatus; to the individual himself it will be both subjective and objective, but to the listener it will be entirely objective. The impression given to either speaker or hearer will depend upon the acoustics of the mouth and the conditon of the subjective and objective hearing of the individual.

Vocal Nodules in Children. Coolidge[1] reviews the literature of vocal nodules, and reports a case occurring in a girl, aged ten years. She had been hoarse for five years, having acquired a habit of speaking loudly on account of a companion's deafness. Adenoids were removed about the same time without producing any alteration in the character of the voice. Laryngeal examination showed two pearly white nodules: one on the border of each vocal cord, between the anterior and middle thirds. Coolidge calls attention to the fact that vocal nodules are rarely mentioned as occurring in children. In his own experience they not infrequently appear as early as four or five years of age. He believes that they often disappear during adolescence, especially in boys at the time of the change of voice. He has seen them much more frequently in boys than in men. Rest and the proper use of the voice are the essential points in their treatment.

Use of Adrenalin to Define New-growths and Infiltrations. St. Clair Thomson[2] describes a method of defining new-growths and infiltrations

[1] Boston Med. and Surg. Jour., May 30, 1907.

[2] Jour. Laryngol., Rhinol., and Otol., August, 1907.

in the mucous membrane by the use of adrenalin which he discovered by accident. Some months ago a patient was very anxious to have a deformity of her nasal septum rectified. She had been under treatment for some time with lupus in the larynx, pharynx, inferior turbinals, and on the face; but all had apparently been completely arrested. She was therefore ordered in for a submucous resection of the septum, and half an hour before the operation the septum was prepared in the usual way by applying to it strips of ribbon gauze soaked in equal parts of adrenalin and 20 per cent. cocaine. When the patient was on the operating table and the gauze removed, Thomson was much struck with the appearance of the mucous membrane over the deviation. It was, of course, insensitive, and was thoroughly blanched, but standing out remarkably by contrast were several apple-jelly deposits, each about the size of a pin's head. The operation was therefore abandoned.

This patient was observed on several subsequent occasions in the clinic, and when inspected no one would suspect that there was anything amiss with the rosy mucosa of the septum, but after the application of adrenalin the apple-jelly points stood out. These were subsequently touched with the galvanocautery, and the phenomenon then ceased to recur. He has since employed this method in several cases of lupus, and now considers that no case is thoroughly inspected or cured until the apple-jelly points cease to appear after applying adrenalin.

Recently, when performing thyrotomy for epithelioma of the larynx in a syphilitic and very alcoholic subject, after the thyroid cartilage had been split, the tissues were so uniformly congested that it was difficult to assure one's self of the extent of the growth. Some adrenalin, with about 2 per cent. cocaine added, was applied on a pledget for ten minutes. At the end of that time the growth by contrast was so well defined that it was seen to invade not only the affected vocal cord, but to extend across the anterior commissure to the front of the other cord. From the previous laryngoscopic examination there was only a slight suspicion of this extension; the adrenalin rendered it positive. Infiltrations and new-growths, owing to the low grade of tissue, are, of course, supplied with vessels of feeble contractile power. This explains why the surrounding healthy tissue blanches under the astringent action of the suprarenal extract, while the vessels in the new-growth remain distended and appear congested, or even turgid, by contrast. Its diagnostic assistance has not proved of much service in tuberculosis.

Potassium Iodide and Mercury in Tuberculosis of the Upper Air Passages. Grünberg[1] states that potassium iodide and mercury frequently exert a beneficial influence on primary tuberculosis of the nose and throat. In the cases which he reports syphilis could be positively excluded, and he is of the opinion that some of those which have been reported as syph-

[1] Münchener medizinische Wochenschrift, August 20, 1907, Nr. 34.

ilitic conditions of the upper air passages simulating tuberculosis, and cured by potassium iodide and mercury, were in reality purely tuberculous processes.

Effects of Spirits and Drugs on the Upper Air Passages. Crothers[1] observes that the effects of spirits and drugs on the upper air passages are very marked and common, and yet they do not attract attention. It is always a question whether these effects are due specifically to any one cause or combination of causes, or are the results of general conditions one intensifying the other; thus low vitality, sudden changes of temperature, reflex irritations, and congestions in distant parts, may all combine to produce disturbances: (1) The direct irritant action on the bronchial, pharyngeal, and nasal membranes, with thickening, anemia, and congestion; (2) the reflex irritant action from gastritis and other disturbances and irritations to other parts; (3) organic changes and paralysis of nerve tracts, cirrhotic states of the liver, kidneys, and mucous membranes generally.

In his experience of nearly thirty years in the constant study and care of spirit and drug neurotics, it is an exception to the rule to find persons who have used spirits and drugs, and do not suffer from catarrh and subacute inflammations of the throat and nose. It is always an interesting question whether these inflammatory changes preceded the spirit and drug taking as exciting and predisposing causes, or followed as a natural result. Many persons have a history of nasal and throat congestions due to direct irritation, followed by exhaustion and debility, for which spirits and narcotics have been found most agreeable remedies.

Alcohol and tobacco seriously impair and finally destroy the vocal powers. These effects are due to both local and constitutional changes in the bloodvessels and nerve filaments and absorbents. Probably one of the most dangerous and seductive drugs is cocaine, which has come into very common use. The paralysis resulting from the constant use of this drug in the nasal passages extends down to the throat and larynx. The changed tone of the voice registers this inflammatory condition. The hearing also is affected, and profound anemia of the nasal passages is often a symptom of the use of the drug. Tobacco is another irritant and narcotic to the upper air passages. Like cocaine its effects are direct, and in chronic conditions, where the system is thoroughly infected, it is an active cause of disease of these membranes. One of the worst forms in which it can be used is the cigarette, and this is due specifically to the combustion taking place in close proximity to the mouth, where all the gases and products come in immediate contact with the mucous membrane. In the case of the pipe and cigar, many of these poison products are condensed and deposited in the stem of the pipe and body of the cigar, and only a small part is carried into the mouth. Morphine

[1] Medical Record, June 8, 1907.

and other forms of opium have no specific direct effect on the upper air passages, except that of a narcotic, and these effects are followed by anemia and general pallor of the face and eyes. The senses are diminished and low forms of subacute inflammatory states of the membrane follow. They are thickened, and fibrinous deposits come on. The control of the voice is weakened, and general conditions of exhaustion appear. Other drugs have a similar effect, only more pronounced, on the constitution.

OTOLOGY.

By ARTHUR B. DUEL, M.D.

Labyrinthine Suppuration. Undoubtedly no field in otological surgery has commanded so much attention or stimulated so much enthusiasm as that of *Purulent Inflammation of the Labyrinth.* A few years ago little or nothing was heard of this condition, while now otological literature teems with reported cases and monographs on the subject. It may well be said that operative surgery of the labyrinth in the past year or two marks a new epoch in otology. Why this has happened may be easily realized when one thinks of the increasing number of operations performed for chronic otorrhea. With improved illumination, a better knowledge of anatomy, and more careful technique, it is not surprising that many cases with fistulous tracts leading into the labyrinth should be found, owing to a careful inspection of every case, stimulated by such observers as Jansen, Kuemmel, Friedrich, v. Stein, Zeroni, Goerke, v. Hinsberg, and many others. That this careful observation has been necessary for the reporting of so many cases is evidenced by the fact that a large percentage of them presented no symptoms whatever of labyrinthine involvement; and still another large percentage exhibited only peculiar symptoms which were brought about by special examinations and functional tests. There is little doubt that the zeal for operating on such cases when they are discovered has resulted in many deaths which otherwise would not have occurred, owing, in some instances, to the breaking down of barriers which nature had erected to prevent the entrance of infectious material to the meninges, and in others to faulty technique from inexperience or an insufficient knowledge of anatomy.

Realizing the intricate anatomy, the important structures, the direct routes to the meninges, one cannot wonder at the fatality of the most carefully executed operation in this field, or doubt that in many instances nature would have given the victim a much better chance than the bungling operator. This is by no means intended as an invidious criticism of many careful men who have advanced this most difficult surgery a step nearer perfection by reporting their failures, but rather as a rebuke to those reckless experimenters who, with no accurate knowledge of the anatomy, and a bungling technique, having placed their victim beyond the hope of relief, neglect to record their failure. Certainly this work should be attempted by no one not fortified by an intimate knowledge of the anatomy and a skill which has been acquired by repeated operations

on the dead subject, supplemented by appreciative observation of experienced operators. A most exhaustive paper was read at the fifteenth meeting of the German Otological Society in Vienna by Professor v. Hinsberg, of Breslau, (1) "On the Significance of Operative Findings for the Diagnosis of Purulent Inflammation of the Labyrinth during Exposure of the Middle-ear Cavities. (2) "Indications for Opening a Purulently Affected Labyrinth."[1] Schroeder's report of this, together with the discussion, shows the status of many distinguished men.[2]

He reports statistics agreeing with those of Friedrich. Labyrinthine suppuration occurs once in each one hundred cases of purulent middle-ear disease, so that it is more frequent than all the intracranial complications (meningitis, brain abscess, sinus thrombosis) combined. The labyrinth also affords a path of infection for the meninges and for about half the cases of cerebellar abscess. Males are more often affected than females (33.3, Breslau Policlinic). The affection is usually unilateral. After a consideration of the theoretical possibilities in infection of the labyrinth the reader of the paper called attention to the following two paths as of practical importance from the standpoint of aural surgery.

1. From the middle ear only after destruction of the bony wall of the labyrinth at some point:

(*a*) By injury.

(*b*) By inflammatory processes.

2. By way of the posterior surface of the petrous portion after rupture of a deep-seated extradural abscess.

In regard to the first form, the most important injury which may occasion labyrinthine suppuration is a fracture of the base of the skull. Injuries of the labyrinth by projectiles or foreign bodies introduced through the external meatus are less apt to be followed by this complication. In the case of foreign bodies there is generally an added element of injury by direct violence. Traumatic perforation of the labyrinth may also occur at operation, intentionally or otherwise.

While the various forms already mentioned must be borne in mind, they are of slight etiological importance compared with the suppurative processes. Acute otitis rarely leads to labyrinthine suppuration if we except protracted cases and those of scarlatinal panotitis, in which erosion of the labyrinthine capsule is not at all uncommon. Of chronic forms, cholesteatoma and tuberculosis are most apt to destroy the inner wall of the tympanic cavity and antrum. While perforation may take place at any point, it shows a preference for the two fenestra, the promontory, and the ampulla of the horizontal semicircular canal. In regard to fistulæ of the semicircular canal, the reader agreed with Friedrich, Kuemmel, and Goerke that they are of minor importance as paths of

[1] Zeitschr. f. Ohrenhlk., 1906, vol. lii, Nrs. 1 und 2.

[2] Archives of Otology, vol. xxxvi, Nos. 1 and 2. Trans. by Fridenberg.

labyrinthine infection. On the contrary, the most frequent point of perforation is the fenestra ovalis, then the secondary tympanic membrane, and finally the promontory. Several "fistulæ" are often found together. Multiple fistulæ, however, are seen rather frequently when pus breaks through from within outward. In the course of an otitis media purulenta a deep-seated extradural abscess may develop over the posterior surface of the petrous portion. The suppuration may now spread, by erosion of the posterior or upper semicircular canal, to the labyrinth itself. (Cases of Jansen, Habermann, and of the speaker.) Hinsberg then discussed the development of fistulas of the semicircular canals, drawing a distinction between primary fistulas, caused by pus penetrating into the depths, and secondary fistulas, by perforation, from within outward, of pus which had entered the labyrinth by some path or other.

In case of purulent perforation of the round window, the foot-plate of the stapes is either completely destroyed or perforated, or the annular ligament is more or less completely disintegrated.

Perforation of the oval window and at the promontory can usually be detected microscopically, after removing the granulations, while perforations of the round window can never be seen with the naked eye. Destruction of the inner wall of the tympanum is usually due to caries, rarely to necrosis, although the latter change may occur, particularly at the ampulla of the semicircular canals.

The spread of infection to the labyrinth depends on the path and nature of the infecting agent, its virulence, the natural protective powers of the organism, the location of the perforation, and last, but not least, the more or less favorable opportunities for drainage and escape of the pus. Thus we may have diffuse or localized labyrinthine suppuration, the latter more commonly in case there has been a reactive inflammation with the formation of adhesions of a protective nature which may prevent the spread of the suppuration for a time, or even permanently. The last possibility seems to be given most frequently by a cholesteatoma. The tissue changes in the labyrinth are generally most marked at the point of entrance of the pus, *e. g.*, in case of perforation through the oval window, in the vestibule and the scala vestibuli; in case of perforation through the membrana tympani secundaria, in the scala tympani. The changes may spread continuously from the port of infection, or may skip certain sections of the inner ear. The latter condition is noted quite frequently in suppuration following fracture of the base.

The reader of the paper then discussed the ways by which suppuration may reach the cranial cavity from the interior of the labyrinth. This may take place by preformed paths, or the pus may make its way by erosion of the capsule of the labyrinth at any point, but most frequently of the upper or posterior semicircular canal. The preformed paths are:

1. Spontaneous dehiscences over the eminences for the posterior or upper canal (very rare; one case of Dunn's).

2. The acoustic nerve.

3. The aqueducts.

Infection by way of the aquæductus cochleæ seems to be more common than was formerly believed. In cases of infection through the aquæductus vestibuli, an empyema develops in the saccus endolymphaticus. The latter form of infection has now been reported in 25 cases. Boesch claims that it would occur still more often but that the narrow bony canal is generally occluded by a barrier of granulation tissue.

Empyema of the endolymphatic sac leads in a few rare cases to a rapid destruction of the cerebral wall and stormy meningitis. Generally, however, the affection runs so slow a course that there is plenty of time for adhesions to form about the sac. Diffuse meningitis is thus prevented, while cerebellar abscess is a frequent result (59 per cent. of Boesch's cases), and this leads to secondary involvement of the meninges.

Hinsberg then discussed in detail the path of infection through the aquæductus cochleæ and the nerve channels.

All paths described and hitherto reported lead to the posterior cranial fossa. This should always be borne in mind and special attention paid to the cerebellar fossa on the development of even slight cerebral symptoms in the presence of a recognized labyrinthine affection.

In order to understand the symptoms of inner-ear suppuration, we must bear in mind that this section contains not only the auditory function, but that of static equilibrium as well, and that each of these organs may present positive or negative symptoms, depending on irritation and on loss of function, respectively. Irritation of the terminal elements in the cochlea causes subjective sensations of sound; that of the vestibular and canalicular system, vertigo, disturbances of equilibrium, nystagmus, nausea, and vomiting. Destruction of the terminal elements in the labyrinth causes deafness when the cochlea is involved; and, when the ampullar nerve endings are affected, disturbance of equilibrium, *without* vertigo or nystagmus. These data make it easy to understand the clinical picture of labyrinthine suppuration, particularly of the manifest forms, but the relation between symptoms and pathological changes is not yet cleared up.

Symptoms of irritation may depend, as Jansen has pointed out, on a combination of anatomical changes and increase of intralabyrinthine pressure. Hinsberg then described the symptoms as we see them at the bedside: the vertigo, the nystagmus, the nausea and vomiting; then subjective sensations due to irritation, and the negative symtoms due to loss of function of the cochlea. There is little or no fever in uncomplicated cases of labyrinthitis. A rise of temperature usually means that bac-

teria or toxins have advanced along the nerves or through the aqueducts into the cranial cavity, and have produced cerebral complications. Changes in the optic nerve head, paralysis of the abducens, and slowing of the pulse are very improbable in uncomplicated labyrinthitis. The influence of inner-ear suppuration on the pupil has not yet been explained.

In discussing the course and termination of labyrinthine suppuration, Hinsberg mentioned the factors which predispose to a sudden extension of the purulent process to the interior of the cranium, even in latent cases. One such factor is the retention of pus in the middle ear. In case a direct communication is present, this, of course, leads to damming up of pus in the labyrinth. Neglected otitis, with marked formation of granulations, infection, or swelling up of cholesteatoma, extraction or cauterization of polypi may lead to such occurrences. These factors are not the most common. Usually we see after some major operation in aural surgery a sudden development of acute meningitis in a patient who was apparently in good health, except, of course, for the local affection. We know now that at least in one-half of these cases an unrecognized latent labyrinthitis was the connecting link. Statistics were submitted by Hinsberg showing the danger of major operations.

In the diagnosis, static and dynamic tests of equilibrium and careful tests of hearing are important. The methods recommended by Bezold are to be carried out. This must be completed by laying open the middle ear and carefully inspecting the wall of the labyrinth for fistulæ or translucent spots in the canal walls. Hinsberg also deprecates any fear of the region of the oval window, and shows how this region can be attacked without danger to the patient. The same thing holds true for the promontory and the round window.

Based on the functional examination before operation in connection with the conditions found during operation in the labyrinth wall, Hinsberg distinguishes the following types of disease:

1. Diffuse labyrinthine suppuration. Symptoms:
   - (*a*) Before operation:
     Deafness and evident irritative or defective phenomena in the apparatus of equilibrium.
   - (*b*) During operation:
     Defect of the stapes, possibly complicated with fistula of the semicircular canal.
2. Localized disease of the semicircular canal. Symptoms:
   - (*a*) Before operation:
     Symptoms of irritation with comparatively good hearing.
   - (*b*) During operation:
     Fistula of the semicircular canal. (Stapes preserved.)

Or,

(*a*) Before operation:

No irritative or defective symptoms, with comparatively good hearing.

(*b*) During operation:

Fistula of the semicircular canal.

Finally there are cases of labyrinthine irritation in which no infection has taken place. The details must be read in the original paper. In the differential diagnosis of cerebellar abscess and labyrinthine suppuration, Hinsberg gives a number of new and important points. The mortality reported by various authors varies from 25 to 86 per cent. In diffuse otitis interna, according to Hinsberg, it is at least 15 to 20 per cent.

As to treatment, the first consideration is to give free egress to the products of inflammation pent up in the inner ear, and to prevent reinfection from the purulent focus in the middle ear. To effect this, Hinsberg claims that it is necessary to open up the cavities of the labyrinth as widely as possible from the middle ear. A statistical resume of the cases in which this postulate was met shows that the mortality has already been reduced to 4.2 per cent. Hinsberg discusses in detail the indications for immediate operation and for temporizing. The operative technique is described with relation to topographical landmarks. He at first followed Jansen's method, but has now devised an original procedure, starting at the oval window. Neumann's method is considered the best for a number of cases in which there is a complication with deep extradural or cerebellar abscess. During operation it is well to watch for an escape of cerebrospinal fluid. Hinsberg has never seen any fluid in case of diffuse involvement of the labyrinth, while it is invariably met with when a normal inner ear is laid open wide. Healing takes place from the depths by granulation and epidermization. Operated cases invariably show complete deafness and symptoms of defect in the static apparatus.

In the discussion Herzog (Munich) said he had for the past year examined the ears of every patient admitted to the hospital for *pulmonary tuberculosis*. He found that, of 100 tuberculous males, 17 were affected with chronic otitis media purulenta, 21 ears in all. In 6 of these suppurating ears functional tests showed deafness (labyrinthine involvement); in 3 cases his deafness had developed while the patient was under observation. The 6 ears represented 5 patients, so that 5 per cent. of the tuberculous males had labyrinthine suppuration.

Kuemmel (Hamburg) analyzed the data submitted by Hinsberg, and cannot admit that labyrinthine involvement is especially frequent in tuberculous otitis media. In 26 cases operated by him, tuberculous labyrinthitis was found in 6. Of these, 3 were a special type of "necrosing" tuberculosis. Careful histological examination would probably show tuberculosis to be a failure in a still larger percentage of sequester forma-

tion in the labyrinth. Necrosis in tuberculous otitis presents a typical clinical picture in children. One sequestrum after the other is thrown off, so that the entire petrous portion may be extruded. In many of his cases Kuemmel had the impression at first that they would run a favorable course, but eventually all of them died of meningitis. In all cases of rapid extensive destruction of the labyrinth tuberculous changes should be looked for with extreme care. Brieger also agreed with Kuemmel as to the frequency of tuberculosis as a factor in labyrinthine suppuration.

Scheibe (Munich) notes that vertigo is very unusual and very slight in tuberculous affections of the inner ear.

Panse (Dresden) lays stress on the necessity and possibility of recognizing an affection of various parts of the labyrinth, and presented microscopic specimens in support of this contention. He submitted a diagram for uniform use, and advised careful histological examination of as large a number as possible of auditory and equilibrium organs which had been tested functionally intra vitam.

Passow (Berlin) reported postmortem findings which were of great importance for a further study of the paths of infection from the labyrinth to the meninges. Macroscopically, a typical empyema of the saccus endolymphaticus was made out. Microscopic examination showed quite unexpectedly that the aquæductus vestibuli and the saccus were free, and that an extradural abscess had stimulated a pus accumulation in the sac. It appears, accordingly, that the diagnosis of empyema of the saccus endolymphaticus can only be made with certainty on the basis of a microscopic examination.

Goerke (Breslau) thinks macroscopic examination must be superseded more and more by careful histological investigation. He has observed an undoubted case of empyema of the saccus which was then demonstrated. His investigations show that pus rarely makes its way through dehiscences.

Barany (Vienna) describes in detail the methods used in Politzer's clinic to determine the condition of the vestibular apparatus. Syringing with water at different temperatures (test for "caloric nystagmus") was the most reliable method. Habermann (Graz), however, believes syringing, particularly with cold water, to be rather dangerous.

Denker (Erlangen) raises the same objection to the hopping test, which shakes the patient up seriously and may cause trouble, and Wanner (Munich) alludes to the danger of tests in which forced turning is used.

Von Frankel-Hochwart thinks it of importance to consider the occupation of the patient, and to ask what motions are usually made, and which now are difficult or cause vertigo.

Brieger mentions a method of getting footprints in case of suspected ataxia or disturbance of equilibrium. The soles of the patient's feet are painted with 5 per cent. solution of ferrocyanide, and he then walks on a strip of linen impregnated with liquor ferri.

Heine (Koenigsberg) presented a statistical report from Lucae's clinic in Berlin. In 277 cases seen there was a mortality of 8.3 per cent.

Neumann (Vienna) presents the present standpoint of the Vienna school (Politzer) in regard to operation in labyrinthine involvement. As soon as suppuration has been determined beyond a doubt, the radical operation is performed in every case. The question whether to open the labyrinth at this time or to temporize is decided by the conditions found at operation (fistula), and by the condition of the labyrinth, functionally, as determined by tests before operation.

In the discussion on operative technique, attention was called by Kuemmel to the marked tendency of the labyrinth to heal up. Bearing this in mind, it is important to make a sufficient breach in the round window and in the anterior portion of the cochlea. Newly forming pus then escapes of its own accord and spontaneous healing can take place.

Politzer remarked that labyrinthine suppuration may extend to the peripheral portion of the auditory nerve, and may even then become limited by demarcation. The meatus auditorius internus must accordingly be considered in labyrinth operations.

Neumann (Vienna) lays stress on the rapid healing made possible by his method. Complete epidermization takes place in eight weeks. On the other hand, when the labyrinth is opened from the tympanic side, danger to life is removed, it is true, but the patient is exposed to a long convalescence, which may last for a year or more, before complete healing takes place.

Eagleton reports 7 cases of *labyrinthine suppuration*, in 5 of which *von Stein's symptom* was present.[1] He looks upon the symptom as being of much value. Many are inclined to doubt this, however, and some look upon it as a dangerous procedure from the possibility of the severe concussion producing an infection of the meninges by breaking down protecting granulations.

Richards,[2] in the discussion of Eagleton's paper, called attention to many sources of error: First, through any irregularity of muscular action on the two sides, as to hesitation due to fear of falling—a badly arched foot, irregularity in length of limb. A patient, if he be right-sided (handed), attempting to jump in a straight line, as in the test mentioned, will deviate to the left and eventually so tend to fall if the eyes are closed. Under normal conditions he is kept in alignment, and in a condition of equilibrium, through his ability to orient. With the eyes closed (as in the test), the supporting influence which orientation gives to the preservation of equilibrium is cancelled. As a result, a disturbance of the statical sense occurs, which may be totally independent of a labyrinthine lesion.

Second, as the patient hops along, he is not in contact with the floor a sufficient length of time to gain a correct subjective appreciation (through

[1] Archives of Otology, June, 1907. [2] Ibid.

what we may term the muscular sense) of his proper relation to the objects about him, or to the floor upon which he moves. The test consequently tends to produce a condition of disturbed equilibrium by disconcerting the muscular sense.

Von Stein's test is not only subject to many errors, but it makes no attempt to test the patient's statical sense with reference to definite planes corresponding to the primary planes of the semicircular canal system. It has a tendency also to create a condition of inequilibrium by disconcerting the muscular sense and by suppressing orientation. If, therefore, upon applying the test, a condition of disturbed balance is made manifest, we are at a loss to know what factor is responsible; in other words, the test is not a differentiating test.

Further, if the invasion of the labyrinth has been gradual, thus giving the remaining factors (whatever these may be) sufficient time to compensate for the loss, no disturbance of equilibrium may be made manifest by the application of von Stein's test.

In several cases in which Richards removed the major portion of the labyrinth the patients subsequently did not respond to von Stein's test.

In testing labyrinthine cases, we wish to disturb to a minimum degree all other factors concerned in the preservation of equilibrium. We therefore have the patient first stand with eyes open and note the direction in which he tends to fall. If disturbance of station follows, we may, if we find the labyrinth involved, attribute the disturbance to the definite lesion by elimination.

We next repeat the test with the eyes closed. If no disturbance of equilibrium is made manifest, we now have the patient stand and move the head as a pendulum upon the body in the planes of the semicircular canals, testing his station with reference to each plane separately.

The eyes should be closed, as moving objects in the field of vision may be a factor in producing dizziness. We here, too, cancel the supporting influence which the eyes contribute to the preservation of the station, but with the patient standing still, *i. e.*, with the muscular sense undisturbed, this supporting influence is not so necessary as when the patient is made to jump, as in von Stein's test.

Should no disturbance of equilibrium follow, we should now have the patient stand with eyes closed and rotate the head in such direction as to cause disturbance of the labyrinth fluid with reference to the combined planes of the canals. This quickly causes an exquisite degree of vertigo even in the normal individual.

We should select some given point, as the chin, for the sake of uniformity, and state, when making the test, in which direction this point is made to move—as under normal conditions the chin when rotated from left to right causes the patient to fall to the left, and vice versa, the head being rotated as mentioned above.

After testing a patient and tabulating the resulting disturbances of

equilibrium, and noting the pathological lesion in the labyrinth and the part of the labyrinth involved, we may hope to make some progress in labyrinthine localization.

Richards, at the meeting of the American Laryngological, Rhinological, and Otological Society, in June, 1907, read an exhaustive report of 12 cases on which he had operated.[1] His consideration of the questions of diagnosis and advisability of operative intervention is worthy of most careful study. The paper is particularly valuable, however, on account of the detailed technique which he has advised as a result of extensive work on the cadaver, in addition to the experience gained in the 12 cases reported.

The first step of the operation, as described, consists in rendering the outer capsule of the labyrinth accessible by performing a Schwartze-Stacke operation, in which the facial ridge is lowered to its utmost limit and the fringe of bone on its anterior aspect removed, together with the external hypotympanic wall. This exposes the outer wall of the vestibule, the windows of the labyrinth, and the dome of the jugular fossa when the latter structure is in a high position.

The removal, then, of the prominence of the anterior wall of the auditory canal, together with the lip of bone overhanging the mouth of the Eustachian tube, and the evulsion of the tensor tympani muscle secures the greatest possible width to the apex of the cavity, and the exposure of the canal of the carotid artery.

The arches of the three semicircular canals are next removed, some care being necessary to prevent injury to the facial nerve during the removal of the horizontal semicircular canal, as this and the Fallopian canals are intimately associated. The labyrinth is then entered through the solid angle of the canal system, a conical pit, with its apex inward, being excavated at this point. The posterior portion of the vestibule is in this way fully exposed and the danger of overlooking fistulas through its inner wall avoided.

When the necrotic process has involved the Fallopian canal to that degree where its sacrifice is necessary, its roof is first shaved off and the facial nerve is then lifted from its bony gutter, which allows the facial ridge to be removed without injury to the nerve.

The exposure of the facial nerve throughout its entire circumference is followed by paralysis, which, without other injury to this structure, is temporary, though the loss of function may persist from five to six months.

When the Fallopian canal is not sacrificed through disease, it remains and represents a bridge of bone which spans the cavity of the vestibule and in which is concealed the facial nerve.

The exposure of the anterior portion of the vestibular cavity is now

[1] Laryngoscope, October, 1907.

accomplished by the removal of the posterior aspect of the promontory, care being taken during this step to avoid injury to the dome of the jugular bulb below, and to the inner wall of the vestibule internally, which latter structure at this point bulges outward owing to the encroachment of the internal auditory meatus upon the cavity of the vestibule.

Injury to the inner vestibular wall is accompanied by the loss of cerebrospinal fluid, and, as the intracranial cavity is opened to infection, it constitutes a serious accident, the chief danger being from meningitis.

If after the exposure of the vestibular cavity it is found that the disease invades the cochlea, the roof of the first cochleal whorl is then removed from behind forward to a point just short of the eminence of the carotid canal. Injury to the carotid artery is not a likely accident, as the interior of the first cochleal whorl is separated from this vessel by a partition of bone, which, though thin, serves the purpose of an efficient shield. In addition the artery is loosely attached in its canal, and when impinged upon readily gives. The structures which are chiefly liable to injury during this step are the internal auditory meatus and modiolus.

This latter structure is particularly liable to injury during the exploration of the remaining portion of the cochleal cavity, which is referred to as the most difficult step in the operation, and which is next in order.

The dangers attending the exploration of the main cavity of the cochlea are due to its being hemmed in on all sides by important structures, to the small size of the cavity itself, and to the fact that the modiolus or small pyramid of bone contained in its interior is exceedingly brittle and, from its position, exposed to fracture—which, when this occurs, tends to do so at its extreme base—causing the internal auditory to be opened throughout the major portion of its circumference, with excessive loss of cerebrospinal fluid.

To avoid injury to the modiolus during this step of the operation, a small window is made through the cochleal shell at a point corresponding somewhat to the apex of the cavity. Later, this window is enlarged with a small gouge, which is not allowed to impinge upon the little pyramid representing the modiolus. This point on the cochleal shell is selected, for should by accident the gouge impinge upon the pyramid, it does so at its extreme apex, its weakest point, where its fracture is of no consequence, and, in fact, constitutes a succeeding step in the technique.

In rendering the exterior portion of the cochleal cavity accessible throughout, it is necessary that a portion of the modiolus be removed, and it may be shown that the apex of this pyramid may be lowered with safety to a point corresponding to the termination of the first cochleal whorl. Should the removal of the pyramid be continued below this point, the intracranial and operative cavities may be placed in direct communication through the numerous minute canals which traverse the pyramid from its base toward its apex.

The cochleal cavity is now exposed throughout its entirety, with the

exception of the second half of the first whorl, which, as now seen over the stump of the pyramid, is roofed over by a thin bony partition, which is readily broken down, and with the removal of which the entire cavity is fully exposed.

Otitic Brain Abscess. It is not surprising, in view of the fact that more than 50 per cent. of all brain abscesses are of otitic origin, that our literature should teem with reported cases. It is a little discouraging, however, to find that the percentage of recoveries is so small, the method of localization so uncertain, the technique so variable, and often open to just criticism. One cannot escape the impression that this difficult surgery has been forced upon many who have been incompetent to undertake it, and that an experienced surgeon would have been more successful. It is rather suggestive of faulty methods to find, on one hand, so many reported cases where unsuccessful search was made for a suspected abscess, which was subsequently found at the autopsy, and, on the other hand, so many, the drainage of which completely relieved the symptoms for a time, death nevertheless occurring later from meningitis or encephalitis, plainly the result of exposure of new areas to infection from the abscess.

It is clear that in many of these cases recovery would have followed the drainage of the abscess, had it been possible to accomplish this by some procedure which would have avoided the infection of healthy meninges or brain substance.

So evident has this improper technique been that during the last year an eminent neurologist, shocked by the observation of a number of bungling operations on cases in which he had participated in the diagnosis, criticised most severely the usual methods of otologists in general, and even ventured to outline a technique which they should follow. Although the methods suggested were really inadequate for the best results, according to the light now brought to bear on such cases, the criticism was timely, inasmuch as it awakened otologists to the fact that they had an opportunity which they were hardly making the most of. There is no doubt that the otologist should be competent to do good intracranial surgery, since the present advances in his work constantly lead him into that realm. Moreover, the fact that fully one-half of the intracranial lesions requiring surgical intervention are directly associated with aural suppuration should stimulate him to acquire an experience which would make him excel the general surgeon in this work.

The only alternative for the aural surgeon is to face the proposition and equip himself with a sufficient knowledge of intracranial surgery, so that he may be in a position where he shall not encounter the just criticism of his confrères when he attempts such work. Undoubtedly the Lettsomian Lectures of the Medical Society of London for 1906, by Mr. Charles Ballance, embrace the latest and most practical consideration of this subject. These lectures, on "Some Points in the Surgery of the

Brain and its Membranes," are now published in book form,[1] and should be read by all who are interested in the work. He says: "In my surgical life the evolution of the operation for brain abscess has advanced a good stage toward perfection. Not many years ago but few surgeons had ever made any attempt to operate for brain abscess; but at the present time, in every surgical clinic, such operations have been performed. Although we are at present only on the threshold of a perfect understanding of abscess of the brain, yet the labor of many workers during the last twenty years has not been in vain, and the future is bright with promise."

S. MacCuen Smith, in a paper on "Our Faulty Methods of Brain Localization in Intracranial Lesions Complicating Aural Diseases," calls attention to the "hit-or-miss" methods employed, and deplores the fact that more accurate indications have not been deduced from the large amount of material with which we come in contact. He expresses the hope that vivisection may throw much light on the subject in the near future, and believes that a proper utilization of the knowledge thus gained will be the means of saving hundreds of lives now unnecessarily sacrificed.

Noting the brilliant achievements in localization through the motor area made possible by experiments on the lower animals, he expresses the hope that false notions of antivivisectionists will not prevent similar triumphs in studies of the areas presiding over the intellect, sight, speech, smell, hearing, and general sensation.

Fortunately for otologists, brain abscesses of otitic origin present fewer difficulties than those from other causes, owing to the fact that in a large percentage of them a careful examination will reveal the direct route of infection—into the cerebellum from the petrous, or the lateral sinus, and into the temporosphenoidal lobe through the tegmen tympani. Ballance has called particular attention to this point, and believes that failure to find this "stalk" of infection caused by inflammatory agglutination of the meninges has been due to lack of careful inspection. He says: "To reach the brain by direct continuity from extension of a local infective cranial lesion infection must first traverse the meninges. In a rapidly extending infective process diffuse meningitis would be the most probable result; in the more slowly spreading infection resulting from chronic disease the meningeal infection would be localized by adhesions and time given for extension of disease to the brain."

The same point is illustrated by the fact that abscess of the brain or sinus infection is a more common complication of chronic ear disease than is acute suppurative meningitis, whereas meningitis has been the most usual result in those cases, now happily rarely met with, in which attempts to extract a foreign body from the ear have been so unskilfully

[1] Macmillan & Co., 1907.

made that intracranial infection has followed. Here the meninges are directly infected, as in accidental injury.

In some cases of slowly spreading infection from chronic disease adhesions occur, obliterating the cavity of the arachnoid at the site of infection and binding together dura, arachnoid, pia, and cortex. The lymphatic sheaths of the numerous small bloodvessels which traverse the cortex at right angles to its surface are in direct communication with the subarachnoid space, and through these, as through a number of capillary tubes, infective matter easily traverses the cortex and reaches the white substance within.

The cortex is very vascular, and its connective-tissue element, reinforced by numerous prolongations from the pia mater, is abundantly supplied with connective-tissue corpuscles. Hence it is able to offer a strenuous resistance to the bacterial attack, and does not ordinarily undergo any extensive destruction. Where it is traversed by the infective material a barrier of fibrous tissue is thrown out, limiting the destructive process to the formation of a narrow track.

The white substance is much less resistant, and it would seem that the greater the distance from the cortex the more easily does bacterial action cause dissolution of brain substance.

Thus the abscess comes to assume a mushroom-like shape, with the narrow portion or stem attached to the dura at the original site of infection from the bone.

When the dura has been separated from the bone over a more or less considerable area adhesion of the meninges takes place to a much greater extent.

The more recent the abscess the nearer will it lie to the spot where the infection traversed the dura, and the more evident will be the stalk or its remains. The older the abscess the greater is the apparent recession from the dura and the less evident the remains of the stalk.

This formation of a stalk is utilized in the operation for the drainage of the abscess. It is evident that when a stalk can be found, and the abscess entered through it, there is no danger of exposing fresh areas to infection from its contents. This stalk offers the additional advantage of effecting drainage by a tube the walls of which remain separated. The tendency to fall together, as when the route has been through a healthy brain tissue, is thus avoided. The actual injury to the brain cortex in draining an abscess through the point of attachment to the dura is very slight, even when the stalk is too small to furnish efficient drainage. Ballance points out that the urgent symptoms can be tided over by this means, and strongly advises that this be done. Should a larger opening, in a different position, then be required, a preliminary operation is done by incising the dura and packing the incised edges down against the underlying meninges by sterile gauze until agglutination takes place. In twenty-four or forty-eight hours the abscess may then be entered through

a larger incision in this area, without risk of infecting the surrounding meninges.

Naturally, there are some cases where no stalk can be found, and the urgency of the symptoms demands an immediate attempt to locate the abscess by exploration through healthy dura and brain cortex. Cases in which recovery has followed operation, although the patient had been unconscious for hours, and where artificial respiration was necessary for long periods, have been recorded.

It would seem wise, when no stalk can be found and the symptoms are not too imminent, to follow the plan of making preliminary incisions through the dura, and, after adhesions shall have formed, to make the exploratory incisions through the area thus walled off from the subdural space.

Ballance's statistics show that a second abscess in the temporosphenoidal region is rare; in the cerebellum, frequent.

That the cerebellum is exposed to infection from the whole posterior surface of the petrous and sinus groove, while the middle fossa is only exposed over the tegmen tympani, is pointed out in support of the statistics of St. Thomas' and Great Ormond Street Hospitals, that *cerebellar abscess* is much more frequent than temporosphenoidal.

Otorrhea. BIER'S METHOD OF TREATMENT OF PURULENT OTITIS BY CONGESTIVE HYPEREMIA has, on the whole, been received with little favor. Fleischmann[1] treated 24 cases: 8 without complications, 12 with mastoiditis, 2 chronic otorrheas with acute mastoiditis, 2 of perichondritis. His conclusions were that the method was dangerous, owing to the fact that the congestive hyperemia frequently relieved the pain while the process was extending, and that, as a consequence, an intracranial complication might develop which would have been avoided by an early operation. Inasmuch as it was certain that not all cases could be cured by the method, and there was no certain conclusion to be reached as to which one might develop dangerous complications, he seemed inclined to report unfavorably on its employment. Iseme[2] reports on 11 cases of acute purulent otorrhea, 1 chronic, 9 of the 11 having mastoiditis, treated by the same method. His conclusions are the same as Fleischmann's. Horslauer,[3] on the other hand, reported on the method as being a distinct advance in the treatment of otorrhea, despite the fact that only one favorable result was recorded in 14 chronic cases, and 30 per cent. of 23 acute cases came to the mastoid operation. Since it seems impossible to establish any law as to the stage of otorrhea in which congestive hyperemia is applicable, or the length of time it should be continued before operative intervention is advised, it seems impossible that it will last as a well-recognized method of treatment.

[1] Monatsschrift f. Ohrenheilkunde, 1906, Nr. 5.
[2] Arch. f. Ohrenheilk., lxix, pp. 131–148.
[3] Münch. med. Wochenschr., 1906, Nr. 34.

The meetings of the American Otological Society at Washington, the American Laryngological, Rhinological, and Otological Society at New York, and the Laryngological and Otological Section of the American Medical Association at Atlantic City were all characterized by numerous papers advocating more conservative methods in dealing with a large number of the chronic otorrheas with which otologists were confronted. Both the papers and the discussions which followed evidenced the fact that it had been borne in upon nearly all present that the zeal for operative work in this attractive field had often impelled men to advise radical operations, in such cases, where more conservative methods would undoubtedly have sufficed. There is little doubt that many cases have been subjected to the radical operations, and cures recorded, where patient and careful conservative treatment would have been sufficient. On the other hand, it is also probable that futile conservative methods have been pursued in many cases until intracranial complications have transformed a serious condition into a precarious one. To find the golden mean between this meddlesome surgery and dangerous delay requires a nice judgment which permits no arbitrary rules.

In opening the discussion of Frederick L. Jack's paper, "Ossiculectomy in Chronic Middle-ear Suppuration,"[1] read at Atlantic City, I called attention to the fact that the operation was very limited in its usefulness, inasmuch as it failed to bring the operative field into view. It was, therefore, inadequate in cases where there were symptoms of mastoid tenderness—pain, temperature, or possible labyrinthine invasion. It could also be set aside as inadequate in cases of cholesteatoma or tuberculosis. Leaving out all these conditions, it might be sufficient in a part of the remaining cases. Which part, however, no one could be certain, and it was, therefore, wiser to warn those who were subjected to it that a more radical operation might have to be performed subsequently. The expressions in favor of it in preference to the radical operation, on the ground that it conserved the hearing, seemed not well founded. The fact that hearing seemed better in a case which could be cured by simply removing the ossicles only meant that the disease was not as extensive as in that which required the radical, and subsequent repair had not interfered as greatly with the transmission of sound waves. In other words, the radical operation, if performed on the same case, would have given as good a hearing result as the ossiculectomy.

The employment of *skin grafts* for the purpose of hastening dermatization of the excavation in the radical operation seems to be much less in favor than formerly, the general impression being that the majority of cases do as well without as with them. Grafting at the primary operation has been largely abandoned. The large grafts, lining the whole cavity, from one to two weeks after the first operation (according to Ballance)

[1] American Medical Association Press, Section on Laryngology and Otology, June 4–7, 1907, p. 113.

are still employed by a few operators; many more, however, prefer small grafts, distributed about the cavity.

The Mortality of Ear Disease and its Importance as to Life Insurance.[1] Max Levy interviewed 37 German insurance companies in regard to their attitude toward risks suffering from *chronic otorrhea*, with the following results: 20 refused such risks; 16 decided each case on its merits after an examination and report from a competent otologist; 1 insures such cases, barring indemnity when death results from consequences of otorrhea. The author claims that statistics do not justify the refusal of such risks except on the advice of a skilled aurist after careful examination.

The statistics of one company showed a mortality of 0.12 per cent.; the Charité Hospital, 0.6 per cent. The greatest mortality from consequences of otorrhea occurred from ten to twenty, then diminished up to 40, when it again rapidly increased.

Pneumatocele. H. Fest reports, in his Thèse de Lyon, 1907,[2] several interesting cases of *pneumatocele* of spontaneous mastoid origin.

These tumors were due to (1) "congenital perforations of the mastoid epiphysis;" (2) to "constitutional fragility of the mastoid cells." Treatment consisted in incision and pressure.

The Leukocyte Count in the Diagnosis of Ear Conditions. F. E. Sondern read some conclusions on this subject at the November meeting of the Otological Section of the New York Academy of Medicine.

Reviewing a large experience in this work, in cases of otorrhea and its extensions, he believes that the relative proportion of polymorphonuclear leukocytes to the total leukocyte count is, in the vast majority of cases, a fair index to the patient's resistance, and is of great diagnostic and prognostic value. While many reported findings do not agree with this position, he thinks it probable that the discrepancies are often due to faulty methods in carrying out the somewhat arduous task of making the count. MeKernon,[3] in a valuable contribution on the subject, reports the results in 166 cases; and, in the main, confirms the position of Sondern. Neither he nor Sondern advocate entire dependence on the differential leukocyte count or bacteriological examination of the blood in the determination, but consider it frequently of inestimable value.

Bacteria from Middle Ear and Mastoid. There seems to be an increasing tendency on the part of all who report interesting clinical cases to record the results of microscopic examinations of smears and cultures from the middle ear and mastoid cells. That this is always of interest and often of great importance there can be no doubt. In view of the fact, however, that the presence or absence of certain organisms (notably streptococci, pneumococci, Friedlander's bacillus, etc.) is often made the de-

[1] Deutsch. med. Wochensch., 1907, Nr. 13.

[2] Revue Hebdom. de Laryng., Otologie, etc., September 1, 1907.

[3] New York Medical Journal, January 19, 1907.

ciding point of whether or not a certain operation is indicated, it seems not inappropriate to call attention to the important work of Andrews and Horder on "A Study of the Streptococci Pathogenic for Man,"[1] carried out in the Research Laboratory of St. Bartholomew's Hospital, London. These studies were made along the lines indicated in a previous study by Gordon,[2] by applying nine tests, as follows: (1) The question as to the clotting of litmus milk in three days at 37° C. (2) The reduction of neutral red broth during incubation anaërobically for two days at 37° C. (3) The production of an acid reacion in three days anaërobically at 37° C. when cultivated in slightly alkaline broth containing 1 per cent. of saccharose. (4) Ditto, but lactose. (5) Ditto, but raffinose. (6) Ditto, but inulin. (7) Ditto, but salicin. (8) Ditto, but coniferin. (9) Ditto, but mannite.

By the application of these tests to 300 streptococci from saliva, Gordon was able to classify them into 48 *different chemical types*. A. C. Houston, applying eight of these tests (excluding coniferin) to 300 streptococci from normal human feces, found that they fell under 40 different types.

Andrews and Horder applied the same tests to 200 strains of streptococci and pneumococci from human disease processes. The discussion of the methods used and results are intensely interesting, and should be read in order to appreciate their great importance. Suffice it to say that they were able after much labor to classify 1200 colonies of streptococci examined by Gordon, Houston, and themselves into seven groups.

To one who has looked upon all streptococci as being of the same importance, these results are astounding, for in these seven groups, arranged from forty to fifty species, there exists the widest differences in their virulence, and the kind of processes they incite. Under these circumstances it is obviously impractical, from a smear or simple culture, to determine the virulence of streptococci, and, without the use of these differentiation tests, the organism, as shown by smears and simple cultures, can be considered of little value in determining upon an operation when physical signs seem insufficient to demand it.

At the meeting of the Otological Section of the New York Academy of Medicine, November 8, 1907, this question was brought up in the discussion of a paper read by Libman, "The Value of the Bacteriological Examination in Otological Work."

While Libman was unwilling to admit the value of Gordon's differentiation tests, the general discussion favored the idea that clinical symptoms would have to be relied upon largely in determining the advisability of operative intervention. The appearance of untoward symptoms in the presence of certain organisms might lead to an earlier operation in some instances, but the presence of the organism, minus the

[1] Lancet, September 15, 1906, p. 708.

[2] Ibid., November 11, p. 1400.

symptoms, would not furnish sufficient ground for operation, even though it had been known to cause extensive destruction in other cases.

Surgical Anatomy of the Temporal Bone from Birth to Adult Life.[1] This was made the subject of the Hunterian Lectures before the Royal College of Surgeons, by Mr. Arthur H. Cheatle. In them he has brought out many important facts from the study of a series of 500 bones, a valuable collection, which he invites all who are interested in the subject to examine.

I felt more than repaid by availing myself of this opportunity last September, as well as by reading the lectures. The most striking fact which they bring out, and which Mr. Cheatle demonstrated to me while I was looking at the collection with him, is one in which I had, in connection with most of my confrères, I believe, held an erroneous view. All who have operated frequently for the cure of chronic suppurative otitis, by the so-called radical method, have undoubtedly been impressed by the fact that the bone from the cortex down to the antrum was, in a large majority of the cases, of ivory-like hardness. I have many times, while operating, spoken of this "eburnation" to those who were looking on, as being a result of many acute exacerbations of the chronic inflammation. I have frequently heard others of large experience attribute the condition to the same cause, and had come to look upon it as a generally accepted fact. It seems, however, this is a normal condition existing in fully 20 per cent. of all adult bones, owing to the fact that no cells have developed in this area. Inasmuch as this is always the condition in early infancy, Cheatle refers to this form of temporal bone as "the infantile type." That this is obviously correct is pointed out by the fact that the small cluster of fine horizontal cells which is constantly present in the outer antral wall in the youngest bones is also always present in the adults which have the dense bone outside of them. Should the denseness of the bone have resulted rom obliteration of the cells by the inflammatory process, these fine horizontal cells would naturally also have been obliterated at the same time. Cheatle pertinently points out that this very condition is usually present in the cases in which a radical operation is necessary, because the dense wall, containing no communication with the tip cells, has prevented an extension of the suppuration to them. Hence the possibility of curing the case by a small excavation which does not include the tip cells.

Physiology of Tone Perception. It is most gratifying, in view of the general tendency of all otologists to pursue the attractive operative surgery of suppurative conditions, to find such careful and laborious work as that undertaken by Shambaugh in his studies of the anatomy of the labyrinth. His microscopic studies of "The Origin of the Cells Found in the Deeper Layer of the Stria Vascularis"[2] are most interesting and important, and throw much light on the physiological function of this

[1] J. & A. Churchill, London, 1907.

[2] Archives of Otology, vol. xxxvii, No. 3, p. 241.

important structure. His resume points out that: "1. Two views exist regarding the origin of the cells found in the deeper layer of the stria vascularis. One is that these cells are derived from the surface layer of epithelium; the other is that they are of connective-tissue origin.

"2. In the development of the stria vascularis three distinct stages are found: First, where a single row of epithelium is found along the outer wall of the ductus cochlearis, having a distinct basement membrane, which separates it from the underlying connective tissue; second, where a broad reticular layer has formed beneath the surface layer of epithelium. In this stage the basement membrane has completely disappeared and the bloodvessels of the reticulum have formed. Third stage, the condition found in the adult stria vascularis. Here the stria represents a narrower band than is found in the second stage, protoplasmic processes from the surface layer of epithelium have penetrated the entire stria, and the reticulum has been completely obliterated.

"3. A study of the transition from the first to the second stage brings out the fact that the basement membrane separating the epithelium from the connective tissue persists until the formation of the reticulum of the second stage is well advanced. The position occupied by this basement membrane is not directly beneath the surface layer of epithelium, as it would be in case the reticulum was derived from the underlying connective tissue. The basement membrane is found passing through the midst of the cells forming the reticular layer and at a considerable distance from the surface layer of epithelium. This position of the membrane proves definitely that the cells forming the reticulum are derived in part from the surface layer of epithelium and in part from the underlying connective tissue.

"4. The bloodvessels of the stria are placed directly beneath the surface layer of epithelium, and as soon as formed are enveloped in protoplasmic processes from the surface layer. In addition, the cells immediately around the bloodvessels are clearly derived from the surface layer of epithelium, so that while the cells found in the deeper layer of the stria are in part epithelial and in part connective tissue, we are justified in assuming that the stria vascularis represents a true vascular epithelium."

Interesting as this is, it remained for Shambaugh, in his subsequent work in the Hull Laboratory of Anatomy, at the University of Chicago, to bring out still more important facts in his "Re-study of the Minute Anatomy of Structures in the Cochlea, with Conclusions Bearing on the Solution of the Problem of Tone Perception."[1] His conclusions bid fair to alter the theory of tone perception laid down by Helmholtz.

It was clearly established that:

"1. The membrana tectoria is normally attached to the cells resting on the membrana basilaris by an adhesion between the 'Streifen of

[1] American Journal of Anatomy, August 1, 1907, vol. vii, No. 2.

Hensen' and the cells just internal to the inner row of hair cells. The hairs of the hair cells normally project into the under surface of the membrana tectoria, to which they are more or less closely adherent.

"2. The membrana tectoria, many hundred times larger near the apex of the cochlea than at the beginning of the basal coil. It contains an enormous number of delicate fibrillæ, which vary in length from one end of the cochlea to the other. These are held together by a semifluid medium, which has approximately the same specific gravity as the endolymph in which this membrane is suspended.

"3. The membrana basilaris, toward the lower end of the basal coil in the vestibule, usually becomes so stiff and rigid as to preclude the possibility of its being a vibrating structure. A complete absence of a membrana basilaris was also sometimes noted near the beginning of the basal coil, where a perfectly formed organ of corti still persisted."

Shambaugh points out that a consideration of these anatomical facts must alter, in some respects, our conception of the process of tone perception.

The Helmholtz theory gives the most plausible explanation of the various phenomena of tone perception.

Two of the fundamental hypotheses in this theory are: First, that the perception for the several tones takes place in separate and distinct parts of the cochlea, the higher tones being taken up by the organs in the beginning of the basil coil, the lower tones near the apex of the cochlea; second, that there exists in the structures in the cochlea a mechanism which takes the part of physical resonator, responding in one part of the cochlea to tones of a certain pitch and in another part to tones of another pitch.

Helmholtz attributed to the radiating fibers of the membrana basilaris this important function of resonators. This hypothesis appears untenable in the light of the anatomical facts brought out under "3." The absence of a vibrating membrana basilaris near the lower end of the basal coil shows that the stimulation of the hair cells in this locality is accomplished without the intervention of a vibrating basilar membrane. The logical conclusion, therefore, is that the stimulation of the hair cells throughout the cochlea is not dependent on the vibration of this membrane.

It seems probable that the stimulation of the hair cells is accomplished only through the medium of their projecting hairs. The hypothesis that each hair cell acts as its own agent in selecting its stimuli from the impulses passing through the endolymph is shown to be untenable for a number of reasons; chiefly, however, because the relations, as shown under "1," which exist normally between the hair cells and membrana tectoria will not permit of these impulses coming in direct contact with the hair cells. These hairs are embedded in the under surface of the membrana tectoria.

The stimulation of the hair cells must, therefore, occur only through an interaction between the hairs of the hair cells and the membrana tectoria.

Since, as shown above, it is improbable that this interaction can be accomplished through the vibration of the membrana basilaris tossing the hair cells up against an overhanging membrana tectoria, the logical conclusion is, that the stimulation of the hair cells is accomplished through vibrations of the membrana tectoria transmitted to it by impulses passing through the endolymph.

The membrana tectoria is shown to be so constituted anatomically as to be capable of responding to the most delicate impulses passing through the endolymph. Furthermore, the great variation in size of this membrana from one end of the cochlea to the other, together with its fibrillar structure, suggests the probable physical basis which renders it capable of acting the part of resonator by responding in one part to impulses of a certain pitch and in another part to impulses of another pitch.

To re-state briefly the process by which the phenomenon of tone perception is accomplished: The sound waves conducted from the air impinge upon the membrana tympani, producing vibrations in it. These vibrations, conducted along the chain of ossicles, transmit impulses to the intralabyrinthine fluid through the medium of the foot-plate of the stapes. The impulses originating in the fluid in the vestibule pass directly into the scala vestibuli, and, through the membrane of Reissner, to the endolymph, where sympathetic vibrations are imparted to the several parts of the membrana tectoria, depending on the pitch of the tone. The vibrations of the membrana tectoria in turn stimulate the hairs of the hair cells, which normally project into its under surface. The nerve impulses originating from all the hair cells thus stimulated by a particular tone come together in the brain centre in the cortex, when the tone picture forms the final step in the process of tone perception.

Progressive Deafness from Atrophy of Corti's Organ.[1] The microscopic examination of the labyrinth in a patient who died at the age of sixty-three, and in whom previous examinations had shown loss of hearing for conversation on the left, hearing for conversation at 15 cm. on the right, showed that on the totally deaf side there was complete absence of the organ of Corti and the stria vascularis and an atrophy of the spiral ganglion and cochlear nerve. On the partially deaf side the organ of Corti and the stria vascularis were atrophic, but no changes were evident in the spiral ganglion or the cochlear nerve. This is extremely interesting, pointing out, as it does, the order of invasion of the labyrinthine structures in this form of deafness.

In this connection, a paper by Wittmaack, "On Vertigo and Disturbance of Equilibrium in Non-suppurative Diseases of the Internal Ear,"[2]

[1] Archiv. internat. d'otol., etc., vol. xxiii, No. 1.

[2] Zeitschr. f. Ohrenheilk., 1907, vol. l, Nr. 2.

is of interest. Wittmaack divides these cases into two groups: (1) Diseases of the auditory nerve, and (2) diseases of the labyrinth. The first class is characterized chiefly by absence of disturbances of equilibrium and by a progressively uniform course. From the examination of a number of cases he attributes this affection to a degenerative *neuritis of the auditory nerve* (cochlear branch).

The second group is characterized by more or less pronounced disturbances of equilibrium. A history of attacks with intervening periods of improvement and diminution of symptoms is given. These attacks are believed to result from small hemorrhages or inflammatory exudates within the membranous labyrinth. Both conditions are associated with some "fundamental general disease," and he cites particularly as a probable cause for the first group the intoxications from sodium salicylate, quinine, alcohol, and nicotine, the acute infectious diseases, syphilis, tuberculosis, constitutional anomalies, such as gout and diabetes, and circulatory disturbances, such as arteriosclerosis and myocarditis.

As etiological factors in the second group, he mentions as most probable those affections which produce multiple diseased foci, especially in the ocular fundus, such as syphilis, chronic nephritis, leukemia, etc.

The conclusions reached by Manasse,[1] after examination of 36 temporal bones from 22 individuals who had suffered from chronic progressive labyrinthine deafness, do not fully agree with those advanced by Wittmaack.

He found in a large number of his cases both cochlear and vestibular branches diseased to some extent. Rarely the vestibular and more frequently the cochlear nerve was more affected.

He supports the idea that disease principally invades the cochlear branch, but not that in these cases the labyrinth and vestibule remain intact.

He confirms the view that in nervous deafness the hearing apparatus is principally involved, and less frequently the organ of equilibrium, but the supposition that the nerve trunk only is involved in cases of the first group he holds to be good only for recently beginning cases in progressive disease when the cochlear nerve is affected.

In combined disease of hearing and equilibrium he was unable to demonstrate the presence of foci and exudates in the labyrinth, as Wittmaack's theory suggested.

Otosclerosis. Norval H. Pierce[2] read an exhaustive review of this subject before the New York Academy of Medicine. He justly objects to the term "otosclerosis," introduced by von Troltsch, on the ground that the process is one of rarefaction; to "spongification of the labyrinthine capsule," because it does not take cognizance of the fixation of the stapes

[1] Zeitschr. f. Ohrenheilk., 1906, vol. lii.

[2] Archives of Otology, February, 1907, The Present Status of the Question of Progressive Spongification of the Labyrinthine Capsule.

in the oval window; to "otitis media catarrhalis sicca," "dry middle-ear catarrh," "otitis media imperplastica," from the fact that the process attacks the bony capsule of the labyrinth and that surrounding the oval window. A history of the subject from 1724, when Valsalva spoke of the fixation of the stapes in his *Tractus de aure humana*, down to the present time is given.

He defines otosclerosis as "a disease of the auditory apparatus, which is manifested clinically by loss of hearing, unaccompanied by change in the tube or tympanic membrane; by certain characteristic functional tests; and, pathologically, by an early loss of motility of the stapes by osseous ankylosis between it and the fenestra ovalis, and by resorption of the normal and reposition of altered osseous tissue in the bony labyrinthine capsule, which reduces its density."

Little light has been thrown on the etiology of the disease. All observers are agreed that it preponderates in females, and has been proved to be hereditary in a large percentage of the cases, having a tendency to be transmitted through the female branches.

Pierce strongly contests the theory of Habermann that syphilis is the causal factor. The usual functional tests were given. Local treatment was deprecated, and dietetic and hygienic measures advised as the only ones likely to be of service.

Chronic Catarrhal Deafness. Randall[1] reports somewhat favorably on the use of *dionin* in chronic catarrhal deafness. He deplores the fact that so many aurists are hardly undertaking the treatment of such cases, "holding too despairing a view as to its promise of results," and contends that while "other lines assuredly offer more brilliant possibilities, yet the host of sufferers tending to increasing disability and distress because of the advance of this insidious disease fully demands persistent effort for their relief." Urging that evident spongification of the labyrinth should not deter one from an effort to relieve its distressing symptoms, he points out the fact that the patent Eustachian tube in otosclerosis permits the introduction of the medication the more readily into the tympanum, and advises a trial of the treatment in these, as well as the hypertrophic cases. A few drops of a 5 per cent. solution are forced into the tube and tympanum through a sterilized silver catheter by "a valveless Politzer bag with a ball tip too large to enter the funnel extremity of the catheter."

Urbantschitsch[2] has written extensively on "The Treatment of Chronic Catarrhal Otitis" by means of *fibrolysin*, which has in many instances improved the hearing and diminished the intensity of the subjective noises. The drug is administered subcutaneously in increasing doses—from 0.3 gm. to 3.0 gm. at intervals of two or three days. If no

[1] Archives of Otology, February and April, 1907.

[2] Wiener klin. therapeut. Wochenschrift, Nr. 6, 1907

improvement follows the administration of ten doses in increasing amounts within these limits, the treatment is abandoned. Twenty to fifty injections are given in cases which show early improvement. Occasional local and general reactions have been observed. Vigorous local treatment, inflations, massage, etc., are advised at the same time. Some cases of marked improvement are reported where previous local treatment alone had been unavailing.

Vibratory Massage of the Drum Membrane and Ossicles. Some years ago, after repeated functional tests of a number of cases treated, by myself and others, by this much lauded method, I abandoned it as being of little use in most cases and decidedly detrimental in many. I then ventured the opinion that it would eventually fall into practical disuse. That this has proved true is evident by the infrequent allusion to it and the lessening vigor of its former advocates. Kerrison,[1] in considering the question preliminary to the recital of some interesting experiments he had made in an effort to apply vibrations in a more rational way, very pertinently calls attention to the defects in the usual methods employed.[2]

1. The movements of the membrana tympani are not those which nature requires of it, or which are necessary to the transmission of sound waves, and do not, therefore, exercise the drum membrane and ossicles in their normal function.

2. The undue strain to which the drum membrane is subjected tends to produce alterations in tension, reducing still farther the patient's hearing power. Pneumatic massage seems to be based on the theory that whatever will move the ossicles will improve the hearing. Its practice does not seem to be governed by any rules based on scientific investigations, the method of its application to different cases being largely a matter of guesswork.

Should this statement be objected to, it may easily be disproved by any one who will throw light on the following questions: By what established rules is the relation between the degree of deafness and the number of vibrations employed to be determined? Should the length of the piston stroke vary in different cases? If so, by what method other than guesswork are such variations to be regulated in accordance with the varying degrees of deafness or ossicular fixation? Recognizing the obvious facts that any loss of tension in the drum membrane will necessitate the employment of greater force, *i. e.*, a longer piston stroke, in order to produce a given movement in the ossicular chain, how are such variations in tension to be determined and allowed for? Employing sufficient force to move the ossicles, how is undue relaxation of the drum membrane to be guarded against? These questions would seem idle except in so far as they may show weak points in a method of treatment from

[1] Jour. Amer. Med. Assoc., December 1, 1906.

[2] Ibid.

which much has been expected and which is still advocated by many distinguished aurists.

Kerrison has experimented with a set of tuning-forks which he has had constructed, producing all the notes of the musical scale from 32 double vibrations (C_2) to 512 double vibrations (C^2), four octaves higher. They present a broad, flat surface, which, when set in vigorous vibration and held close to the external auditory meatus, cannot fail to throw the drum membrane, even though thickened by disease, into more or less vigorous motion.

The hearing is first tested in much the usual way. The hearing distance for the acoumeter and for the conversation or whispered voice is ascertained. The lower tone limit is roughly estimated by means of the Hartmann set of tuning-forks, and the upper tone limit by the Galton whistle.

Increase or diminution of hearing by bone conduction is carefully noted. If the result of these tests points to a tympanic lesion, and the lower limit of the patient's hearing power is not above 256 double vibrations, a more exact estimate of the lower tone limit is made. "The results have varied greatly in different cases, some cases of fairly marked deafness responding favorably, while others of slight impairment have shown little or no improvement. Such contradictory results have occurred in cases apparently equally favorable for this experiment. They apparently depend on differences in the character of the lesion rather than its stage or duration. In those cases in which the experiment has resulted favorably the improvement has been in the direction of improved audition for the lower musical tones and increased hearing distance for the watch or acoumeter. The improvement in certain cases has been marked, the hearing distance for the acoumeter being more than doubled and the range of tone perception being considerably extended.

"The method is cumbersome, and its application necessitates an expenditure of time, rendering it unavailable as a routine measure by men in large practice. Nor have the results thus far demonstrated a sufficiently definite value in excess of what may be accomplished by other means to justify one in proclaiming this measure as a valuable addition to our therapeutic armamentarium."

While these experiments are insufficient to render them practically useful at present, they are of value as indicating the possibility of employing vibrations in a rational way rather than the haphazard concussions which have hitherto been resorted to, and which, in many instances, have undoubtedly done much harm.

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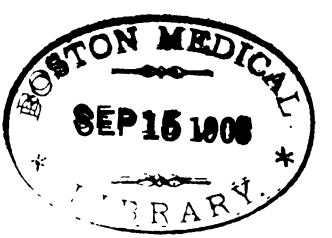
MARCH 1, 1908



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